*October 11, 2021

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TDEC Comment Letter: *Record of Decision for Comprehensive Environmental Response, Compensation, and Liability Act Oak Ridge Reservation Waste Disposal at the Environmental Management Disposal Facility, Oak Ridge Tennessee* (DOE/OR/01-2794&D1)

Dear Mr. Petrie,

The state of Tennessee continues to recognize the importance of selecting a waste disposal option to support U.S. Department of Energy (DOE) environmental cleanup and building demolition projects on the Oak Ridge Reservation (ORR). The draft (D1) Record of Decision (ROD) presents the waste disposal option anticipated by DOE, the Tennessee Department of Environment and Conservation (TDEC), and the U.S. Environmental Protection Agency (EPA), collectively referred to as the Federal Facility Agreement (FFA) Parties. That option is to build and operate the proposed Environmental Management Disposal Facility (EMDF) at Central Bear Creek Valley (CBCV) Site 7c.

According to *EM Strategic Vision: 2021-2031* (p. 36-37), DOE plans to demolish many high-risk facilities at the Y-12 National Security Complex (Y-12) and the Oak Ridge National Laboratory (ORNL) and dispose of the waste in the proposed EMDF.[1] The document states these sites have DOE's largest inventory of high-risk contaminated facilities, including "former research reactors, isotope production facilities, and former process buildings considered to be the worst of the worst" and "areas with dense mercury contamination." Mercury contamination within Y-12's West End Mercury Area (WEMA) is the greatest known environmental risk on the ORR.[2]

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[1] Available at https://www.energy.gov/sites/default/files/2021-04/EM-Strategic-Vision-2021-2031.pdf.
[2] *Strategic Plan for Mercury Remediation at the Y-12 National Security Complex Oak Ridge, Tennessee* (DOE/OR/01-2605&D2/R1); https://doeic.science.energy.gov/uploads/F.0608.006.0982.pdf.

As an important step in the process of selecting a waste disposal option, TDEC reviewed the D1 ROD cited above pursuant to the FFA for the ORR. This letter meets the FFA review cycle protocol of 90 days, including a 30-day extension. The review produced the following comments that require resolution to finalize the ROD.

Negotiations are underway among the FFA Parties to resolve concerns identified during TDEC's review. Agreements have been, are being, and will continue to be reached on these issues at various levels within the organizations. Meanwhile, this letter documents TDEC's review of the D1 ROD as submitted on July 12, 2021 for inclusion in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Administrative Record. TDEC anticipates the final ROD will reflect resolution of concerns identified in this letter.

General Comments

1. **Remedy Protectiveness**
   Per 40 CFR § 300.430(f)(5)(ii)(A) the ROD must describe how the selected remedy is protective of human health and the environment. This D1 ROD lacks the information needed to demonstrate protective waste acceptance criteria (WAC) and landfill wastewater discharge limits. The ROD does not include remediation goals to be met in adjacent groundwater, surface water and other affected environmental media per 40 CFR § 300.430(f)(5)(iii)(A).

2. **Key Concerns**
   In the *Proposed Plan for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Waste* (DOE/OR/01-2695&D2/R1), the state of Tennessee identified seven outstanding issues to be resolved before a ROD selects onsite disposal as the preferred waste management alternative for future ORR waste generated under the CERCLA. This general comment summarizes each issue and evaluates the status of efforts to resolve the concern.

   a. Site Characterization

      TDEC requested that DOE investigate the suitability of the proposed landfill location, known as the CBCV Site 7c. A particular concern was the potential for high groundwater levels in portions of the planned landfill to facilitate contaminant release into streams.

      In response to TDEC's request, DOE collected data on hydrologic conditions at the site and summarized the information in two reports: a "Pre- published Technical Memorandum #1" (TM-1) and a follow-on document called "Technical Memorandum #2" (TM-2). DOE placed the reports and the data in the Administrative Record.

TM-2 (p. 1-2) provides a link to the data in Oak Ridge Environmental Information System (OREIS), but the link is broken. The web address for OREIS has changed several times since TM-2 was issued. DOE should redirect public traffic from the old address to the new one.

Site characterization data revealed high groundwater levels in portions of the planned landfill, which indicate the conceptual EMDF design presented in the Proposed Plan may need revision to elevate the landfill. Per agreement among the FFA Parties, DOE will complete a groundwater field demonstration (GWFD) after ROD approval to establish the elevation of the base of the landfill. Section 2.14.3 of the D1 ROD provides additional information.

b. Identification of Applicable or Relevant and Appropriate Requirements (ARARs)

The FFA Parties must agree upon legal requirements to govern the construction, operation, and monitoring of EMDF. Under CERCLA, these requirements are called ARARs. Compliance with these requirements, including waivers and exemptions approved with adequate justification, is a threshold criterion of CERCLA.

The approved ROD will list the ARARs agreed upon for EMDF. Under CERCLA, the ROD will function similar to a waste management permit under other regulatory programs, so the ARARs are similar to permit requirements. In the D1 ROD, ARARs are listed in Appendix A, and Section 2.13.2 discusses ARAR compliance, including waivers and exemptions DOE is requesting.

The ARAR section of the ROD should note 1) the absence of language to address a specific situation as an aspect of the remedy in a CERCLA decision document, including ARARs to be either met or appropriately waived, means the scope of the remedy does not include the situation and requirements pertaining to it, and 2) the state of Tennessee retains its authority to impose the standards of the legal requirement both substantive and procedural outside the context of CERCLA and the Federal Facilities Agreement.

c. Waste Acceptance Criteria (WAC)

WAC are limits on the kinds and amounts of waste that may be placed in the landfill. WAC determine which wastes require treatment and/or disposal at suitable offsite facilities due to their radioactivity, toxicity, or hazardousness. WAC are important for protecting the public and the environment over the long term, when engineered infrastructure, access restrictions, and other controls may deteriorate or fail. The approved ROD will list WAC meeting CERCLA requirements and additional limitations agreed upon for EMDF. Several comments included below address the CERCLA threshold criterion for protectiveness of public health

based on meeting the EPA's risk management range of $1x10^{-4}$ to $1x10^{-6}$ cumulative excess lifetime cancer risk (ELCR) and hazard index (HI) less than or equal to 1.[3]

d. DOE Assessments

Separate from CERCLA, DOE Orders require completion of a Performance Assessment (PA) to predict the proposed landfill's ability to protect the public from radionuclide releases in the first 1,000 years following landfill closure (capping). DOE Orders also require completion of a Composite Analysis (CA) to evaluate the potential combined effects of multiple contaminant sources.

DOE completed these technical assessments and used the PA results to develop WAC for radionuclides in accordance with DOE Orders. DOE Headquarters issued a Preliminary Disposal Authorization Statement (PDAS), authorizing construction of EMDF for the disposal of radiological waste. Although the PA and CA are not CERCLA documents, DOE included them in the CERCLA Administrative Record at TDEC's request because the state evaluated findings from these documents to inform a CERCLA decision on the proposed landfill.

TDEC's evaluation of the PA/CA is also part of the Administrative Record. While the work documented in those reports was sufficient to obtain a PDAS from DOE Headquarters, TDEC found additional work is needed to develop WAC meeting CERCLA requirements, as described in subsequent comments below.

e. Mercury Disposal

DOE plans to dispose of demolition waste from Y-12 in the proposed EMDF. Mercury contamination within Y-12's WEMA is the greatest known environmental risk on the ORR, according to the *Strategic Plan for Mercury Remediation at the Y-12 National Security Complex Oak Ridge, Tennessee* (DOE/OR/01-2605&D2/R1). The state is concerned about disposal of waste from Y-12 because of its potential to release mercury into landfill wastewater discharged into Bear Creek. Fish in Bear Creek and downstream in East Fork Poplar Creek already contain excessive mercury. Both streams are posted by the state to discourage fish consumption. From a public health perspective, the greatest potential threat of mercury disposal in the EMDF would be increases risks to people who eat fish caught downstream. Therefore, the final ROD will describe how the FFA Parties will manage mercury

[3] Although EPA's risk management range is 10^{-4} to 10^{-6} cumulative ELCR and the all-pathways dose assessment is allowed to meet EPA's 10-mrem/year dose limit, it is TDEC's position that evaluations of the groundwater-to-surface-water pathway used to develop WAC must meet a cumulative ELCR of 10^{-5}. This is based on TDEC's interpretation of the Dispute Resolution Decision (DRD) issued by the EPA Administrator on December 31, 2020 and compliance with Tenn. Comp. R. & Regs. § 0400-20-11-.16(2) [10 CFR 61.41], which will be an EMDF ARAR.

disposal to comply with the intent of the Tennessee Water Quality Control Act (TWQA) and avoid adverse impacts to eating fish caught downstream of EMDF landfill wastewater discharges.

DOE's D2 *Focused Feasibility Study for Water Management for the Disposal of CERCLA Waste on the Oak Ridge Reservation, Oak Ridge, Tennessee* (DOE/OR/01-2664&D2) predicted high concentrations of mercury in landfill leachate, ranging between 10,000 and 90,000 parts per trillion (ppt) [see p. E-14]. Although the calculations depended on a mercury disposal strategy DOE termed *macroencapsulation within the landfill cell* that is no longer proposed for use, TDEC remains concerned that disposal of large volumes of nonhazardous mercury wastes within EMDF could create concentrations of mercury in landfill wastewater that overwhelm the treatment system capacity and result in exceedances of mercury discharge limits. Accordingly, DOE should consider application of treatment technologies that decrease the toxicity and/or mobility of nonhazardous mercury waste to ensure discharge limits remain attainable and to protect the receiving stream. Application of such treatment technology to nonhazardous mercury waste would reflect CERCLA's preference for a remedial action that "permanently and significantly reduces the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants" [42 U.S.C. § 9621(b)].

f. Underdrains

Tennessee does not allow drainage features to permanently suppress the water table at proposed landfill sites. This is consistent with Tennessee rules, including Tenn. Comp. R. & Regs. §§ 0400-11-01-.04(3), 0400-11-01-.04(4)(a)(2), 0400-20-11-.16(5), and 0400-20-11-.17(1)(h). Failure of such underdrains could make the landfill less stable and allow water into the waste. Underdrains also provide routes for any leakage to escape quickly. Either problem could result in contamination of local streams.

The D1 ROD distinguishes between *permanent* underdrains included in some of the onsite disposal locations evaluated previously and *temporary* drainage features to be used during construction and operation at CBCV Site 7c. Revised the text to include a clear statement that the temporary drainage features will only be used to control surface water, perched groundwater, and infiltration. The ROD should also state that EMDF will not rely on drainage features under the waste, including underdrains to permanently suppress the water table.

g. Landfill Wastewater Discharge Limits

The ROD must establish discharge limits for radionuclides and other chemicals in landfill wastewater, consistent with CERCLA and the Dispute Resolution Decision

(DRD) issued by the EPA Administrator on December 31, 2020. This is necessary to comply with TWQA regulations and to protect people using downstream water for recreational activities, including fishing. The FFA Parties are working to establish such limits and develop consensus on how to manage the landfill wastewater. General Comment *9 provides additional detail on TDEC's position.

3. **Code of Federal Regulations (CFR) Citations**
Citations of 30 CFR should be corrected to 40 CFR.

4. **Remedial Investigation/Feasibility Study (RI/FS)**
   a. The RI/FS was not approved by EPA nor the state and is therefore not a final document. Ensure this is clarified in all references to the RI/FS.

   b. Should references to the Remedial Investigation/Feasibility Study (RI/FS) cite the 2018 "errata" version of the fifth (D5) draft of the RI/FS instead of the 2017 version?

5. **Waste/Groundwater Separation**
As noted in Section 1.3 (p. 1-5) and Section 2.8 (p. 2-17), the ROD will include the following Remedial Action Objective (RAO):

> Maintain a 15-ft separation between the bottom of emplaced waste and the seasonal high water table1 of the uppermost unconfined aquifer, which includes 5 feet (ft) of liner system and 10 ft of geologic buffer consistent with TDEC 0400-11-01-.04(4)(a)(2).

Language citing a 15-ft unsaturated zone should be revised for consistency with this wording. Examples include p. 1-5 (last bullet), p. 2-37 (first bullet), p. 2-38 (second paragraph in Section 2.12.2.1), p. 2-53 (middle and last paragraphs), p. 2-54 (first sentence), and p. 2-60 (first paragraph in Section 2.14.3).

6. **Land-Use Designation**
The D1 ROD makes several references to the need to amend the future land-use designation of Bear Creek Valley (BCV) Zone 2 from "recreational" to "DOE-controlled industrial." Does the BCV Phase I ROD also need to be amended to reflect this change?

7. **Bear Creek Valley Wells**
The ROD mentions "hundreds of wells in Bear Creek Valley" on p. 2-3, 2-12, 3-75, 3-106, 3-140, 3-145, 3-152, 3-161, 3-178, 3-195, 3-196, and 3-200. Wells and other borings throughout the valley provide valuable information relevant to understanding the regional hydrogeological setting, but they do not substitute for the data collected at the CBCV site. The site-specific data collected for TM-1 and TM-2 indicate the natural position of the water table is up to 30 ft higher than anticipated by the conceptual

model presented in the draft RI/FS reports. This revelation highlighted the need for the GWFD described in Section 2.14.3 of the D1 ROD.

8. **Landfill Wastewater Definitions**

The ROD should be revised to apply a legally correct definition for landfill wastewater, as provided in 40 CFR 445.2(f), which should be included in the ROD as an ARAR.

The rule defines landfill wastewater as follows:

> (f) Landfill wastewater means all wastewater associated with, or produced by, landfilling activities except for sanitary wastewater, non-contaminated storm water, contaminated ground water, and wastewater from recovery pumping wells. Landfill wastewater includes, but is not limited to, leachate, gas collection condensate, drained free liquids, laboratory derived wastewater, contaminated storm water and contact wash water from washing truck, equipment, and railcar exteriors and surface areas which have come in direct contact with solid waste at the landfill facility.

The ROD should use the term "landfill wastewater" instead of "wastewater" for consistency with this legal definition. The ROD includes incorrect terminology at locations including, but not necessarily limited to the following:

- p. 2-11: 2nd paragraph (revise "clean water" to "uncontaminated stormwater")
- p. 2-18: 4th paragraph after the bullets ("contact water")
- p. 2-38: 4th and 5th paragraphs in Section 2.12.2.1 ("contact water" & "wastewater")
- p. 2-39: 3rd paragraph under Phase 1 Construction ("contact water")
- p. 2-56: 2nd paragraph on the page ("contact wastewaters").

9. **Landfill Wastewater Treatment: TDEC Position**

The FFA Parties have committed to ensuring this ROD establishes protective discharge limits for releases of contaminated landfill wastewater from the proposed EMDF and discharging into nearby waterways. A lot of ground has been covered on this issue over the past few years. Most recently, the EPA Administrator issued a DRD concerning radiological discharge limits. Limits are also needed for the discharge of other chemicals, including but not limited to mercury and PCBs.

The DRD directly addresses the development of radionuclide limits for landfill wastewater discharges into Bear Creek from the EMWMF and the proposed EMDF, and it clearly directs the FFA Parties to establish limits based on site-specific conditions in Bear Creek. The decision also clearly cites the relevance of ARARs such as the Clean Water Act (CWA) and NRC regulations when establishing the site-specific limits. For instance, the decision states, "EPA supports the DOE's application of the *as low as*

reasonably achievable [ALARA] approach within the relevant and appropriate NRC regulations to ensure that application of a NRC regulation also achieves a risk level no less stringent than 10^{-5}."

DOE is currently leading an effort with EPA and TDEC to examine and understand how site-specific conditions in Bear Creek affect potential discharge limits. For example, the team has collected data suggesting the number of fish *currently* in the upper sections of Bear Creek may not support default assumptions found in a standard recreational fishing scenario for fish ingestion. These findings might be interpreted to suggest a higher level of contamination could be discharged into Bear Creek than would normally be acceptable using default CERCLA risk assessment assumptions. In addition, the EPA Administrator recommended the acknowledgement of land-use designations during the development of discharge limits. Because DOE currently controls the land in some of the same areas where fish availability does not presently support default fishing assumptions, development of site-specific discharge limits related to exposure assumptions for these areas appears appropriate. However, for portions of Bear Creek in areas where DOE does not control the land use (e.g., unrestricted land use) and where past studies document actual fishing, it would be inappropriate to develop discharge limits based on alterations of default fishing assumptions.

Although TDEC can generally support the establishment of discharge limits based in part on site-specific conditions in portions of Bear Creek, TDEC does not prefer the single approach of modifying default assumptions throughout Bear Creek in areas controlled by DOE and areas outside DOE control (which have known fishing). Instead, TDEC recommends a multi-faceted approach for protection of environmental resources and the health of people who eat fish caught downstream. Moreover, it seems DOE is working backward from its desired discharge limits to the modified exposure assumptions, as opposed to agreeing to reasonable exposure assumptions first and then working forward to apply the risk range.

It is TDEC's position that landfill wastewater treatment could be adopted for protection of both portions of Bear Creek—i.e., those where DOE does not control the land use as well as those where land use is currently restricted, and it would avoid needless, protracted arguments when there is lack of scientific certainty to establish site-specific risk assumptions. As described in TDEC's July 23, 2021 letter,[4] although the EPA Administrator's DRD did not specifically apply the CWA technology-based approach to the Bear Creek decision, treatment of landfill wastewater is consistent with the DRD when discussing the NRC ALARA approach and the preference for water treatment in the CWA and CERCLA. Both facets should be used to develop protective discharge

[4] TDEC Comment Letter: *Focused Feasibility Study for Water Management for the Disposal of CERCLA Waste on the Oak Ridge Reservation, Oak Ridge, Tennessee* (DOE/OR/01-2664&D3), July 23, 2021; available at https://doeic.science.energy.gov/uploads/F.0600.029.0856.pdf.

limits: adjusting standard default assumptions (e.g., fish consumption rates) for areas controlled by DOE and landfill wastewater treatment to protect downstream users.

In recent discussions with EPA and TDEC, DOE appears to embrace the position that the landfill wastewater would only require treatment if it does not meet the to-be-established discharge limits after the site-specific conditions are considered. In addition, DOE is recommending the modification of default exposure assumptions for areas of the stream flowing through property not controlled by DOE. DOE bases these recommendations on current fish availability in the stream and recent sampling results for contaminants in fish downstream in Bear Creek. While TDEC acknowledges the value of these results for evaluating past discharges of contamination from other sources in BCV (e.g., the Environmental Management Waste Management Facility [EMWMF] and Bear Creek Burial Grounds [BCBG]), TDEC questions the reliability of this data to predict future fish tissue contamination originating from EMDF releases. The EMDF will receive the bulk of its waste from ORNL and Y-12 instead of the former K-25 site at the East Tennessee Technology Park (ETTP). Moreover, the EMWMF has discharged only a fraction of the total allowable DOE limits.

Again, TDEC does not concur with DOE's recommended, single-faceted approach for establishing radiological discharge limits. TDEC is confident that when a reasonable treatment methodology is defined in the EMDF ROD and implemented along with site-specific assumptions for Bear Creek fish consumption scenarios, the FFA Parties should have little trouble agreeing upon final discharge limits that are protective at the point of exposure described in the Administrator's decision. TDEC believes agreement on appropriate treatment will allow quick resolution of this issue while continuing to move the project forward.

Therefore, the FFA Parties should immediately begin discussing appropriate treatment methodologies for the contaminants planned for EMDF disposal which would exceed human health risk criteria for a recreational user with default risk assessment assumptions in portions of Bear Creek. Clearly, the FFA Parties should utilize the flexibility provided by site-specific conditions (e.g., modified fish consumption rates for stream locations with limited fish populations controlled by DOE) while evaluating regulatory compliance at the EMDF. However, site-specific conditions should be used with appropriate treatment, not instead of treatment.

A version of ion exchange treatment using media such as resins is the generally accepted approach for removing radiological constituents prior to discharge. DOE has and continues to use such wastewater treatment methods across the ORR and can lead the discussion of appropriate treatment media for radionuclides projected to be disposed in the EMDF.

10. **Landfill Wastewater Treatment: Text Inconsistencies**

Consistent with the previous comment, the EMDF ROD must commit to the full treatment of radionuclides and hazardous/toxic chemicals in all EMDF landfill wastewater using technologies agreed by the FFA Parties. Treated effluents should be managed consistent with state regulations prohibiting bypasses—e.g., Tenn. Comp. R. & Regs. § 0400-40-05-.07(2)(l).

Active treatment of all landfill wastewater is necessary to meet the CERCLA criterion requiring reduction of toxicity, mobility, or volume through treatment. A commitment to treat the landfill wastewater in this manner would protect Bear Creek and people who use the stream for its designated recreational use, including the consumption of fish caught downstream of EMDF. A documented commitment to appropriate treatment would also facilitate resolution of this long-standing impediment to progress on a CERCLA decision for the proposed EMDF.

The D1 ROD provides inconsistent information regarding DOE's plans for landfill wastewater treatment. Section 2.12.2.4 (p. 2-46, second paragraph) states EMDF landfill wastewater may be discharged directly to Bear Creek or a tributary *without* treatment. However, other parts of the document contradict this statement by stating landfill wastewater will be treated. Examples include, but may not be limited to, the following.

a. Table 2.1, p. 2-22 & 2-23, Reduction of toxicity, mobility, or volume through treatment: For all onsite waste disposal alternatives, including the remedy proposed for selection, the table entry indicates landfill wastewater treatment would reduce contaminants to levels required for discharge. TDEC agrees and notes this is not consistent with the statement on p. 2-46.

b. Section 2.10.4, p. 2-26, 3rd paragraph: This paragraph states onsite waste disposal would reduce contaminant levels by treating landfill wastewater. This is not consistent with the statement on p. 2-46. TDEC requests the addition of the following sentence to the paragraph: "Discharges from the site will be treated to ensure state use classifications for the receiving water bodies are not affected."

c. Section 2.13.3, p. 2-55, 1st paragraph: The last sentence in the paragraph states the overall remedy effectiveness is determined in part by its ability to meet the CERCLA criterion for reduction in toxicity, mobility, or volume. TDEC agrees and notes this is not consistent with the statement on p. 2-46.

d. Section 2.13.5, p. 2-56, 1st full paragraph on page: The text is not consistent with the statement on p. 2-46.

11. **Monitoring of Bear Creek Fish, Surface Water, and Sediment**

Considering the assessment of potential future risks posed by discharges of radioactive landfill wastewater from the EMWMF and EMDF, the EPA Administrator's DRD finds: 1) the individual with the potential maximum exposure to radionuclides in landfill wastewater would be a recreational fisherman who fishes Bear Creek and 2) default assumptions regarding fish consumption, and perhaps other default assumptions, do not represent reasonable maximum exposure at ORR. Based on those findings, the DRD directs DOE to complete fish tissue studies to support the development of preliminary remediation goals (PRGs) to support the establishment of discharge limits for radionuclides in landfill wastewater.

There are uncertainties regarding actual risks to people who will eat fish caught downstream of the EMWMF and EMDF landfill wastewater discharges. Therefore, it is TDEC's position the EMDF ROD should commit to the implementation of a program to routinely monitor levels of radionuclides and other contaminants, such as mercury and polychlorinated biphenyls (PCBs), in Bear Creek fish tissue, surface water, and sediment. The program would provide a straightforward way to demonstrate compliance with Tenn. Comp. R. & Regs. § 0400-40-07-.04(7)(a), which will be an ARAR in the ROD.

At a minimum, the program should continue throughout the operational period of the landfills, and the results should be presented at the appropriate frequency in the annual Phased Construction Completion Reports (PCCRs) for the landfills. Upon closure of each landfill, the FFA Parties will evaluate the data and agree upon any warranted post-closure monitoring.

DOE already completed an initial monitoring effort in the summer of 2021. The results and those from additional samples collected before EMDF begins discharging landfill wastewater should be used to establish baseline conditions, against which data from the future monitoring should be compared.

12. **DOE Directives and CERCLA**

The ROD should document how CERCLA requirements are met by the remedy being selected, including the role of five-year reviews (FYRs) for as long as the EMDF site cannot be used in an unrestricted manner. The D1 ROD includes several references to DOE Directives and associated requirements, including a 1000-year post-closure performance period evaluated by the PA. TDEC recognizes DOE requires compliance with DOE Directives, but the Directives, performance period, and PA dose metrics are not necessarily consistent with CERCLA requirements. If the ROD includes references to non-CERCLA requirements that are not ARARs, it should accurately reflect these requirements are not intended to demonstrate compliance with CERCLA.

13. **Safety**
The D1 ROD includes numerous references to the ability to "safely" operate and dispose of waste in the EMWMF and proposed EMDF landfills. As stated correctly in Section 2.13.2 (p. 2-50), requirements for a CERCLA ROD are designed to protect the environment and the public. This is separate from and does not include compliance with occupational safety requirements, which is required independently and regulated by the Occupational Safety and Health Administration (OSHA), not TDEC or EPA. Revise the language to focus the ROD more clearly on compliance with CERCLA criteria.

14. **Waste Minimization**
The D5 draft RI/FS (p. ES-6) states the ROD will contain a commitment to waste minimization if an onsite disposal alternative is selected. The proposed plan (p. 13) also includes this assurance. Language in Section 2.12.2.4 (p. 2-46) of the D1 ROD falls short of a commitment, stating:

> Sequencing of waste generation, as much as possible, will be a priority to reduce the amount of clean fill required by using contaminated soil waste as fill during the disposal of debris waste. Segregating waste at the generator site and maximizing recycling also will be used. This ROD has a goal for all waste-generating projects to maximize waste minimization.

TDEC appreciates prioritization of minimizing the disposal of clean material in the proposed EMDF. However, the ROD should clarify how a goal in the EMDF ROD meets the commitment when waste-generating projects are not within the scope of the EMDF ROD, as stated in Section 2.4 (p. 2-11).

15. **Offsite Waste**
The EMDF should not accept wastes generated outside the Oak Ridge Reservation (USDOE) National Priorities List (NPL) site boundary, even if they were contaminated by the receipt or transport of material from past ORR operations. The EMDF CERCLA remedy is an onsite action to be conducted entirely within the ORR. Revise the text accordingly, including but not limited to the following:

- Section 2.4, Page 2-11, 5th paragraph on page
- Table 2.4, Page 2-41, 1st row in table
- Section 2.13.2, Page 2-50, 4th paragraph in section.

Preface

16. **Page iii, Last Sentence**
Revise the sentence to clarify the ROD also summarizes and relies on information from the *Focused Feasibility Study for Water Management for the Disposal of CERCLA Waste on the Oak Ridge Reservation, Oak Ridge, Tennessee*.

Part 1: Declaration

17. **Section 1.2, Page 1-3, last paragraph on page**

a. The EMDF D1 ROD states the BCV ROD needs to be modified to change the land use. In conjunction with that effort, the EMDF ROD and BCV Phase 1 ROD must commit DOE to accelerating cleanup of other contaminant sources in BCV. As noted in TDEC's April 17, 2019 letter to DOE, uranium contamination already exceeds risk-based levels in Bear Creek. The EMDF CA assumes future cleanups will resolve this problem by the time EMDF operations cease. Therefore, the EMDF and BCV RODs must commit DOE to achieving substantial cleanup of other BCV contaminant sources before EMDF closure. Accelerated timeframes for cleaning up contaminant sources in BCV must be reflected in the FFA (Appendices E and J). If appropriate, describe how the cleanups would support the antidegradation compliance approach (also known as the mercury strategy).

b. The FFA Parties should discuss and agree upon a Zone 1 land-use designation. Regardless of the designated land use, the stream designation is determined by the Tennessee Board of Water Quality, Oil & Gas.

c. Revise the last sentence to clarify DOE prohibits fishing in the upstream portion of the Bear Creek watershed. It is not accurate to claim fishing is prohibited within the whole watershed. As stated in the previous sentence, fishing *advisories* exist for downstream portions of Bear Creek.

State of Tennessee advisories against fish consumptions are not prohibitions. Available information indicates anglers catch and eat fish caught downstream of Bear Creek, which receives landfill wastewater discharged from EMWMF and is anticipated to receive landfill wastewater discharged from EMDF.

The U.S. Department of Health and Human Services (1998) reports, "Most participants of an exposure investigation conducted for the Tennessee River portion of Watts Bar Reservoir continued to eat the same amounts and kinds of fish or turtles even when they were aware of the consumption advisories."[5]

[5] U.S. Department of Health and Human Services, 1998, *Serum PCB and blood mercury levels in consumers of fish and turtles from Watts Bar Reservoir, Watts Bar Reservoir/Clinch River Operable Unit, Oak Ridge Reservation (USDOE), Oak Ridge, Anderson County Tennessee, CERCLIS No. TN1890090003*, Atlanta, GA: Agency for Toxic Substances and Disease Registry, Division of Health Assessment and Consultation, Exposure Investigation and Consultation Branch.

Campbell et al. (2002) found 48 percent (%) of the people interviewed believed the fish caught in the study area were safe to eat.[6] The study area included the Clinch River arm of Watts Bar Reservoir, downstream of Melton Hill Dam, and Poplar Creek up to the Blair Road access point. The survey found 90% of anglers fishing in Poplar Creek when interviewed had heard about the fish consumption warnings, and 40% thought the fish were safe to eat. Fewer than 5% of anglers who knew about the fish consumption advisories talked about limiting fish consumption. Similarly, Burger and Campbell (2010) found 38% of anglers ate fish they caught in the same survey area.[7]

d. Preventing fishing on Bear Creek within Zone 1 requires enforcement of land use controls. Currently, fishing would involve criminal trespass on restricted federal land. The ROD should clarify that any future decision to transfer ownership of land in Zone 1 would require reevaluating the remedy for risks associated with additional potential exposure pathways.

18. **Section 1.2, Page 1-4, 1st sentence on page**
The cited sentence (and a similar one on p. 2-33) states DOE removes beavers and their habitat from Bear Creek as a best management practice (BMP) to discourage fishing.

a. Clarify whether DOE removes beavers and their habitat from the entirety of Bear Creek, or identify specific stream reaches. In either case, habitat destruction and wildlife removal do not comprise a BMP, particularly as a goal of an environmental cleanup program. Removal of contamination from the ecosystem is an example of a BMP. If removal of beaver dams is a part of the remedy, the ROD needs to provide further explanation regarding the rationale and implementation plans.

b. Has DOE evaluated the ostensible merits of beaver habitat removal (discouragement of fishing) relative to the merits such habitat may provide (reducing downstream transport of mercury-contaminated sediment)?

c. TDEC notes the practice of habitat alteration though beaver dam removal might need to comply with the substantive requirements of a general Aquatic Resource Alteration Permit (ARAP).

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[6] Campbell, K.R., Dickey, R., Sexton, R., and Burger, J., 2002, *Fishing along the Clinch River arm of Watts Bar Reservoir adjacent to the Oak Ridge Reservation, Tennessee: behavior, knowledge and risk perception*, Science of The Total Environment, v. 299, Issues 1-3, November, p. 145-161.
[7] Burger, J., and Campbell, K.R., 2008, *Fishing and consumption patterns of anglers adjacent to the Oak Ridge Reservation, Tennessee: higher income anglers ate more fish and are more at risk*, Journal of Risk Research, 11:3, 335-350, DOI: 10.1080/13669870701795560.

19. **Section 1.2, Page 1-4, last paragraph on page**
    a. Delete the term *permanent* from the first sentence. As CERCLA waste is disposed in the proposed EMDF, ongoing monitoring of EMDF discharges may cause the permanence of disposal of a problematic waste stream to be questioned.

    b. The waste disposal remedy selected in the ROD must address CERCLA's preference for cleanup through active treatment of all landfill wastewater, not just individual waste lot decisions in other CERCLA documents.

20. **Section 1.2, Page 1-5, last sentence in section**
    Add the following sentence to the end of Section 1.2.

    > In addition, the EMDF facility will include treatment of landfill wastewater generated at the site to minimize contaminant transport to downstream receptors.

21. **Section 1.3, Page 1-5, 1st paragraph in section**
    Revise the third sentence as follows:

    > Onsite disposal of most building demolition debris and soil supports timely and cost-effective cleanup, while waste that does not meet WAC will be disposed offsite.

22. **Section 1.3, Page 1-5, last bullet (Footnote 1)**
    Modify the footnote to read: "In this document…across the EMDF footprint, and agreed upon by the FFA Parties (DOE, EPA, and TDEC)."

23. **Section 1.3, Page 1-5, last paragraph**
    Explain how the CBCV site offers the distinct advantage of "…addressing technical challenges related to protection of surface water and groundwater resources…."

24. **Section 1.4, Page 1-6, 1st full bullet**
    a. Point the reader to the location of the WAC within the document.

    b. TDEC and EPA should be involved with DOE in defining and approving operations-based WAC. Consensus and transparency would eliminate conflicts of interest that exist when the party generating the waste has sole responsibility for deciding whether the material meets WAC at a landfill operated by the same party. Regulator involvement in the process, consistent with the FFA for the ORR, would support the oversight needed to ensure WAC compliance. If operational constraints are intended to protect the public and the environment to DOE standards and not CERCLA requirements, the ROD should state such constraints are not being relied on for CERCLA compliance.

Radionuclide inventory limits comprise a key element of protective WAC. Therefore, radionuclide inventory limits must be included in the ROD, as promised in the D5 RI/FS (p. ES-7), not established in a future (post-ROD) document.

25. **Section 1.4, Page 1-6, 3rd full bullet**
Consistent with other statements in the document (e.g., Section 2.12.2.1), revise the first sentence to state "up to 2.2 million cy" instead of "approximately 2.2 million cy."

26. **Section 1.4, Page 1-6, 4th full bullet**
In the first sentence, change "permanently isolate the waste from human and environmental receptors" to "isolate the waste from human and environmental receptors over the long term."

27. **Section 1.4, Page 1-6, 6th full bullet**
Elaborate on the "groundwater and surface water drainage features" to be constructed or cite the appropriate section where the features are described.

28. **Section 1.4, Page 1-6, 8th full bullet**
Expand this bullet to read:

> Construction and operation...consistent with ARARs to minimize the release of contaminants into adjacent and downstream surface water bodies for uptake by potential receptors. The discharge limits are presented...

29. **Section 1.4, Page 1-7, 1st bullet on page**
Modify this bullet to read: "Routine performance...consistent with ARARs to inform the need for any necessary corrective actions during EMDF operation."

30. **Section 1.4, Page 1-7, last bullet in section**
    a. The FFA Parties should discuss and agree upon a Zone 1 land-use designation other than "restricted recreational use." Additional discussion may be warranted regarding any potential effects the designation will have on classified uses of the stream.

    b. Once the land use designation is changed for Zone 1, how will DOE enforce restricted recreation (i.e., no fishing)? The ROD should clarify how DOE will ensure the integrity of the Zone 1 restricted recreation designation will be maintained.

31. **Section 1.5, Page 1-7, 2nd sentence in section**
The cited sentence states, "There is no Principal Threat Waste to be addressed as part of this action." The ROD needs to clarify this statement. Various DOE documents, including annual Remediation Effectiveness Reports (RERs) for the ORR, indicate the

presence of principal threat source material at Y-12 and ORNL. If disposal of principal threat waste is not in the scope of the remedy, the prohibition should be listed among the administrative WAC in Table 2.4.

32. **Section 1.6, Page 1-7, 1st bullet in section**
While noting the reference to waste generation project contaminants of concern (COCs), the text states that Section 2.7 includes COCs and their respective concentrations. Section 2.7 provides no list of COCs and no concentrations. The text should be revised to reflect COC projections assumed in developing WAC and establishing discharge limits for landfill wastewater. At a minimum, the ROD should document key chemicals (e.g., mercury, beryllium, and asbestos) and classes of chemicals (e.g., PCBs and dioxins/furans) anticipated to be placed in EMDF.

33. **Section 1.6, Page 1-7, 2nd bullet in section**
Clarify how waste generation project risk assessments are relevant to EMDF, considering those site-specific assessments are conducted for sites other than EMDF.

34. **Section 1.6, Page 1-7, 4th bullet in section**
Also, Section 2.7, Page 2-16, 2nd paragraph in section
The ROD needs to document how WAC keep potential future risks to the public within EPA's risk management range of $1x10^{-4}$ to $1x10^{-6}$ cumulative ELCR and HI less than or equal to 1, in accordance with CERCLA's protectiveness threshold criterion.[3] The cited text states no baseline risk assessment was conducted for EMDF. CERCLA decisions (RODs) are usually supported by human health and ecological risk assessments. Section 2.7 discusses risk assessments performed in the context of site-specific waste generation projects, but the relevance of those evaluations to the EMDF ROD is not clear, as the EMDF will amass the COCs collected from those projects in a new location, where the risks associated with those COCs have not been assessed.

Part 2: Decision Summary

35. **Section 2.1, Page 2-3, last sentence in section**
Revise the sentence to clarify whether EMDF operations are projected to support the cleanup mission for at least three decades. A draft of DOE's 2021 Appendix J Non-Enforceable Out-Year Planning Targets includes a Remedial Action Report (RAR) for EMDF in 2047, which indicates about two decades of projected operation, based on initiation of operations in the late 2020s.

36. **Figure 2.2, Page 2-5**
Use different colors, cross-hatching or some other symbology to distinguish Site 7A from Site 7C. Because these sites overlap, the boundaries of each site are not clear.

37. **Section 2.2.1, Page 2-7, 2nd paragraph**
Revise the first sentence to acknowledge DOE continued monitoring groundwater levels beyond the initial year required by the approved sampling plan.

38. **Section 2.2.1, Page 2-7, 4th bullet**
Delete the portion of the last sentence that discusses the use of groundwater models to predict groundwater levels after the landfill is constructed. As described in Section 2.14.3, the FFA Parties agreed to determine the seasonal high water table elevation through a field study rather than through groundwater modeling.

39. **Section 2.2.1, Page 2-7, 1st paragraph after bullets**
a. Revise the first sentence as follows:

> Results of the Phase 1 site characterization support final site selection. The results also confirm the CBCV site is suitable for a new, low-level (radioactive) waste (LLW) landfill with the incorporation of an RAO to maintain a 15-ft separation between the bottom of emplaced waste and the seasonal high water table (see Sect. 2.8).

In the context of site suitability, it is imperative to note incorporation of this RAO. Without implementation of the RAO, the CBCV Site would not be suitable, as conceptual designs presented in the RI/FS and subsequent meetings would place waste below current groundwater levels, as stated in Table 2.1.

b. The ROD must specify waste disposal in the EMDF would be prohibited if there is a failure to achieve 15 ft of separation between the waste and the seasonal high water table, as required by the RAO. Per 40 CFR 300.435(b), DOE must ensure all ARARs and terms of ARAR waivers are met and must conform all Remedial Design/Remedial Action (RD/RA) activities to the ROD. TDEC cannot legally approve the landfill design if the remedy does not conform with RAOs and ARARs (including waiver conditions) in the ROD.

40. **Section 2.2.1, Page 2-7, last paragraph**
a. Delete the first sentence or revise it for accuracy. Given the wide range of well completion details and potentiometric surface elevations in BCV, the potential relevance of the statement is unclear.

b. The sentence also requires correction because it is not accurate to state groundwater [water table] elevations are similar to predictions in the RI/FS. Although the D5 RI/FS did not present predicted water table elevations in tabular/numerical form, it provided diagrams showing water table elevations as much as 30 ft lower than levels measured during the subsequent investigation

(reported in TM-1 and TM-2 reports). Water levels measured in subsequent years were even higher.

41. **Section 2.2.2, Page 2-9, 4th paragraph in section**
    a. Should the first sentence cite the 2021 RER instead of the 2020 report?

    b. The last sentence in the cited paragraph states contaminant concentrations in BCV have improved as a result of actions taken to date and notes final remediation goals have not been met. TDEC requests clarification of this text because final remedial goals are not been established in the BCV ROD, which is a Phase 1 document.

    c. Would it be more accurate to state concentrations of *some* contaminants in Bear Creek have decreased over the long term? The 2021 RER states uranium discharges were more than four times the ROD goal for annual flux, and average uranium-238 (U-238) concentrations also exceeded the risk-based goal. It also states EMWMF landfill wastewater discharges increased technetium-99 (Tc-99) concentrations in Bear Creek to levels much higher than typical during November 2019.

42. **Section 2.3, Page 2-10, 2nd bullet**
    Cite the final *Focused Feasibility Study for Water Management for the Disposal of CERCLA Waste on the Oak Ridge Reservation, Oak Ridge, Tennessee* instead of the 2016 (D2) version.

43. **Section 2.4, Page 2-11, 4th paragraph**
    The cited paragraph states treatment of CERCLA waste to meet the EMDF WAC (e.g., Land Disposal Restrictions [LDRs]) is outside the EMDF scope. Statements throughout the D1 ROD indicate the responsibility for documenting hazardous waste treatment will be the waste generator's responsibility. That responsibility should be documented in this paragraph, along with a general description of which CERCLA reports will document such treatment. The paragraph should also be revised to acknowledge generation of mixed CERCLA waste will be reported in conjunction with the Site Treatment Plan.

44. **Section 2.4, Page 2-11, last paragraph**
    The last sentence on the cited page states DOE has completed the required public review and comment on all information associated with the evaluation presented in the Proposed Plan. TDEC anticipates this will be a factual statement upon signing the final ROD. However, as of the D1 ROD (summer 2021), DOE has not completed the required public review and comment on WAC, as the Proposed Plan did not present that information. It is also TDEC's perspective that additional public review and

comment is warranted on updated approaches for establishing landfill wastewater discharge limits and significant changes the D1 ROD incorporates in the ARAR table.

45. **Section 2.5.2, Page 2-13, 1st paragraph**

a. Delete the sixth full sentence, beginning with "Piezometric surface," or revise it for accuracy. Given the wide range of well completion details and potentiometric surface elevations in BCV, the potential relevance of the statement is unclear.

b. The sentence also requires correction because it is not accurate to state groundwater [water table] elevations are similar to predictions in the RI/FS. Although the D5 RI/FS did not present predicted water table elevations in tabular/numerical form, it provided diagrams showing water table elevations as much as 30 ft lower than levels measured during the subsequent investigation (reported in TM-1 and TM-2 reports). Water levels measured in subsequent years were even higher.

c. The seventh sentence states, "The piezometric surface responds to rainfall events, indicating recharge is occurring on the site." TDEC's analysis of the piezometer data suggests direct recharge from infiltrating precipitation accounts for a small proportion of the measured water level fluctuations, relative to seasonal effects from the dry season (summer/fall) to the wet season (winter/spring).

46. **Section 2.5.3, Page 2-13, last paragraph on page**

Cite the reference for the U.S. Geological Survey base flow data mentioned in the second sentence. TDEC requests that DOE provide a copy of the information or a link to its location.

47. **Section 2.5.4, Page 2-14**

Per Tenn. Comp. R. & Regs. § 0400-40-07-.04(7)(a) (an applicable regulation per Table A.2), mitigation is required when an activity results in an appreciable permanent loss of resource value such as the fill of wetlands. In what primary document will DOE propose its mitigation plans for these wetland impacts?

The following general comments were developed during TDEC's review of the EMDF Natural Resource Assessment report. These comments are among several submitted to DOE on November 29, 2018. They are repeated here because TDEC identified several deficiencies in the assessment that serves as the basis for statements in Section 2.5.4 of the D1 ROD. The report was not a primary FFA document, and DOE elected not to respond to TDEC comments.

The assessment described in [the Natural Resources] report is inadequate to comprehensively inventory flora and fauna species in the proposed EMDF area. Examples of key deficiencies include the following:

- Collectively, DOE, TDEC, and Domain 07 National Ecological Observatory Network (NEON) assessments documented 11 state and federally listed flora and fauna species in the CBCV area since 2015. However, the DOE assessment does not document four of these species.

- The report provides insufficient information for several surveys associated with DOE's assessment. For example, the report provides minimal justification to explain the rationale for sampling site choices, and DOE did not sample some parts of the survey area.

- The report does not present species accumulation curves or rarefaction analyses to demonstrate whether the assessment sufficiently represented species living in ecological community at the CBCV site.

- The assessment did not include a benthic macroinvertebrate survey or address the structure or condition of this community. TDEC recommends DOE survey the benthic macroinvertebrate community at the CBCV site, including spring and fall samples, before construction activities affect these communities.

- Upper headwater streams often provide habitat for taxa not typically found further downstream in the watershed. The diversity of fish species is likely limited in headwater streams, so macroinvertebrates are often critical members of healthy stream ecosystems. DOE should identify macroinvertebrates at the lowest taxonomic levels possible. A cursory examination will not provide the necessary information to determine impacts to the aquatic communities during and after landfill construction.

- DOE conducted plant surveys only along streams and tributaries and not within the proposed EMDF footprint. Rare plant species likely exist throughout the survey area, not just along streams and tributaries.

- The assessment did not document at least two common vertebrate species and more than five threatened and endangered (T&E) vertebrate species (among all vertebrate taxa) known or likely to exist in the CBCV area.

- The assessment may have not have adequately sampled cavity-roosting bat species which are often underrepresented by acoustic surveys. Four state and federally listed T&E bat species in the area are cavity-roosting species. DOE should conduct mist-netting and/or direct roost searches to represent T&E bat species at the CBCV site more completely.

- The assessment did not document five species of shrews, four T&E species and one common species, known or likely to live in the CBCV site area. Sherman live traps are not well suited for evaluating fossorial and semi-fossorial species (e.g., moles and shrews). DOE's assessment should use additional methods to produce a more complete inventory of the small mammal community.

- The report states Sherman live traps were set in "strategic locations at each point," but it does not describe how DOE selected the strategic locations. While this approach is common practice, it may inadvertently bias the species captured. For example, setting Sherman traps along fallen logs is a great way to target certain species of rodents that utilize fallen debris as thoroughfares to travel above leaf litter, but setting traps in this manner is likely to miss species that prefer to navigate under the cover of the leaf litter itself.

- The report should provide more detailed information about the duration of the small mammal survey. It appears the survey was not sufficient to characterize the small mammal community. If so, DOE should complete a more thorough inventory of the small mammal community to document other species that may be present, particularly rare species.

- The report indicates 48 Sherman traps (three traps per site at 16 sites across the survey area) were set for a single night. Typical return on small mammal trapping effort is approximately 10% trap success. For 48 traps, DOE was likely to capture only four to five animals per night of trapping. This is not sufficient to describe the small mammal community of any area, especially the CBCV community, which is dominated by a single species (>90% deer mouse, *sensu lato*).

- The report should include more detailed information about cover board sampling for reptiles and amphibians.
    - The report provides no information about cover board placement or location selection. If field crews placed cover boards at strategic locations, as described for the Sherman live traps, the survey may have biased the reptile and amphibian inventory to species that favor microhabitats represented by the selected locations.
    - It is unclear whether field crews placed cover boards on the same night as the Sherman traps. If so, the sampling activities may have interfered with each other if locations for cover boards were near the small mammal trap locations.

48. **Section 2.7, Page 2-16, 3rd paragraph in section**
The cited paragraph suggests the choice is to build EMDF at the CBCV Site or accept risks of no action. This text should be clarified to be consistent with the draft RI/FS reports, which evaluated other alternatives and determined them to be protective.

49. **Section 2.8, Page 2-17, 1st & 2nd bullets**
The ROD does not explain how the remedy will prevent "exposure that exceeds a human health risk of $1x10^{-4}$ to $1x10^{-6}$ cumulative ELCR or HI of 1" required by two of the RAOs.[3]

50. **Section 2.9.2, Page 2-18, 3rd paragraph below bullets**
As noted in General Comment *2f, revise the text to include a clear statement that the temporary drainage features will only be used to control surface water, perched groundwater, and infiltration. The ROD should also state that EMDF will not rely on drainage features under the waste, including underdrains to permanently suppress the water table.

51. **Table 2.1, Pages 2-22 & 2-23**
    a. Overall protection of human health and the environment: The entry for the CBCV site states "Would meet all RAOs." However, the ROD does not explain how the remedy would meet the first two RAOs listed on p. 2-17—namely, preventing "exposure that exceeds a human health risk of $1x10^{-4}$ to $1x10^{-6}$ ELCR or HI of 1."[3]

    b. In the row titled *Long-term effectiveness and permanence* at the top of p. 2-22, the last CBCV Site bullet states, "Temporary drainage features are not expected to be used long term. Temporary drainage features." Revise the bullet to state, "Drainage features are temporary."

    c. For CBCV site (Implementability), Table 2.1states "Reliance on drainage systems expected to be required only during construction." Revise this text for consistency with the language in Section 2.9.2—i.e., that temporary drainage features will only be used to control surface water, perched groundwater, and infiltration and that EMDF will not rely on drainage features under the waste to permanently suppress the water table.

    d. Public acceptance: Update for consistency with Section 2.10.9.

52. **Page 2-28, Table 2.2**
For consistency with CERCLA guidance, the table should present capital (construction) costs and operation and maintenance (O&M) costs separately.

53. **Section 2.10.8, Page 2-29, last paragraph in section**
The cited paragraph states DOE and the state worked together to resolve concerns listed in the preceding bullets. The long-term risk evaluation will hinge on agreements regarding the evaluated scenarios, the locations of points of compliance, and key assumptions, such as flow paths and distribution coefficients. The text should identify specific ROD sections that resolve the state's key concerns.

54. **Section 2.10.8, Page 2-29**
For clarity and completeness, revise text in the six bullets to more accurately reflect the sequence and wording of the seven key concerns documented in the State Acceptance section of the 2018 Proposed Plan. The first three bullets are acceptable. The fourth bullet combines the third and fourth key concerns; the fifth bullet addresses the seventh key concern; and the sixth bullet addresses the fourth key concern again and combines it with the fifth key concern. The sixth key concern is not mentioned. Consider revising to avoid confusion.

55. **Section 2.10.9, Page 2-29, 2nd paragraph in section**
a. The text states DOE received comments from 194 individual commenters. The compilation of comments DOE sent to TDEC on January 16, 2019 included comments from 195 entities (individuals or organizations), accounting for multiple comments from five entities. TDEC and DOE should compare notes to ensure all comments are considered.

b. Consider revising the first sentence in this paragraph as follows to clarify that Part 3 presents public comments in their entirety, not just DOE's responses.

> The Responsiveness Summary in Part 3 of this ROD presents all comments received during the public review and comment period and DOE's responses to those comments.

56. **Section 2.10.9, Page 2-29, 3rd paragraph in section**
See subsequent comment titled "Page 3-4, Summary of Comments and Responses, 3rd paragraph."

57. **Section 2.11, Page 2-32**
The cited section states, "...the concept of principal threat waste does not apply to this decision." The ROD needs to clarify this statement. Various DOE documents, including annual RERs for the ORR, indicate the presence of principal threat source material at Y-12 and ORNL. If disposal of principal threat waste is not in the scope of the remedy, the prohibition should be listed among the administrative WAC in Table 2.4.

58. **Section 2.12, Page 2-33, 2nd and 3rd paragraphs**
As noted in Comment *17b, the FFA Parties should discuss and agree upon a Zone 1 land-use designation. The stream designation will continue to be determined by the Tennessee Board of Water Quality, Oil & Gas.

59. **Section 2.12.1, Page 2-35, 2nd Paragraph**
a. The cited paragraph states CERCLA's preference for treatment as a principal element of the remedy is not germane to a disposal decision. The waste disposal remedy selected in the ROD must address CERCLA's preference for cleanup through active treatment of all landfill wastewater, not just individual waste lot decisions in other CERCLA documents.

b. The cited paragraph also states the CERCLA preference will be addressed through treatment required on waste generated under other CERCLA decisions. Since DOE is managing substantial parts of the Y-12 cleanup as a removal action, as contrasted with a remedial action, clarify which CERCLA reports will document the required treatment for the waste generating projects.

60. **Section 2.12.1, Page 2-35, Last Bullet**
The text states:

> The need for underdrains is limited to consideration under berms. Any/all groundwater intercepts in use during disposal operations are conceptualized as not necessary or operational following closure and will not be under the waste.

For clarity, revise the language as follows:

> Permanent underdrains are not required to control the groundwater table, although temporary drainage features may be necessary to divert surface water, perched groundwater, and infiltration from excavations and improve ground conditions to aid construction.

61. **Section 2.12.2, Page 2-37, 2nd bullet**
TDEC and EPA should be involved with DOE in defining and approving operations-based WAC. Consensus and transparency would eliminate conflicts of interest that exist when the party generating the waste has sole responsibility for deciding whether the material meets WAC at a landfill operated by the same party. Regulator involvement in the process, consistent with the FFA for the ORR, would support the oversight needed to ensure WAC compliance.

62. **Section 2.12.2.1, Page 2-38, 1st paragraph**
The second sentence states the landfill berm may be placed over a stream identified as D-10W. This would require compliance with substantive requirements in Tenn.

Comp. R. & Regs. § 0400-40-07, which are listed as ARARs in the D1 ROD. The requirements must remain as ARARs in the final ROD.

63. **Section 2.12.2.1, Page 2-38, 4th paragraph**
Add "prior to treatment" to the end of the sentence.

64. **Section 2.12.2.1, Page 2-38, 5th paragraph**
Include treatment when discussing landfill wastewater management.

65. **Section 2.12.2.2, Page 2-39, Last paragraph under Phase 1 Construction**
The ROD should clarify plans for phased construction of the landfill and the projected sequencing of waste-generating cleanup and demolition projects.

    a. How does the phased construction approach align with the preliminary design information in the March 4, 2021 EMDF Leachate/Contact Water Treatment Overview, which includes a 2.75-million gallon collection pond in Cell 4? TDEC requests a copy of any subsequent landfill wastewater treatment plans DOE has developed.

    b. Which waste was being referred to on May 12, 2021 when an Oak Ridge Office of Environmental Management (OREM) representative told the Oak Ridge Site Specific Advisory Board (ORSSAB), "some of our waste is heavy and needs to be on the floor of the disposal cell"?[8]

66. **Section 2.12.2.3, Page 2-39, 3rd sentence**
    a. Modify to: "The WAC will be implemented through the WAC Compliance Plan, an FFA primary document …."

    b. The current FFA notes a WAC Attainment Plan for the EMWMF. The FFA would need a minor modification for clarity.

67. **Section 2.12.2.3, Page 2-40, 2nd bullet**
TDEC recognizes DOE completed the PA, from which many of the WAC limits are derived, under its internal Directives. However, WAC must be shown to be protective in accordance with CERCLA to support the ROD. CERCLA requires a remedial alternative to be protective of human health by meeting EPA's risk management range of $1x10^{-4}$ to $1x10^{-6}$ cumulative ELCR and HI less than or equal to 1.[3]

Although not directly related to WAC, which provide long-term protectiveness after landfill closure, the EPA Administrator's December 31, 2021 the EPA Administrator's DRD directs DOE to develop limits for radionuclides in EMDF landfill wastewater to be

[8] Barber, W., 2021, Proposed Landfill Called Central to Y-12, Oak Ridge National Lab Cleanup, *Weapons Complex Monitor*, v. 32, no. 19, May 14.

discharged during the decades of landfill operation to meet $1x10^{-5}$ ELCR based on Tenn. Comp. R. & Regs. § 0400-40-03-.03.

As explained in a review of the PA attached to TDEC's October 15, 2020 letter to DOE, the PA base case alone does not provide a basis for analytic WAC development that satisfies the CERCLA threshold criterion for protectiveness. Moreover, the PA does not evaluate the toxic effects of uranium or of non-radiological contaminants projected for disposal.

In an effort to facilitate resolution of this concern, TDEC offered several suggestions to help DOE develop protective WAC acceptable to TDEC. These approaches focus on WAC development for radionuclides and chemical contaminants. Additional technical analysis (e.g., bioconcentration) are needed for certain chemical contaminants projected to be in the waste, including mercury and PCBs.

(1) Quantitatively evaluate the likelihood of bathtubbing after the institutional control period, based on modeling of liner infiltration with hydraulic head resulting from bathtubbing. Develop inventory-limit WAC from radionuclide concentrations in surface water and groundwater due to modeled estimates of liner overflow rate. This approach should address both compliance with ARARs, such as groundwater and surface water protection standards (e.g., uranium maximum contaminant level [MCL] and ambient water quality criteria [AWQC] values), as well as protectiveness under CERCLA ELCR and chemical hazard criteria, including site-specific assessment of fish-ingestion and agricultural exposure pathways.

(2) Apply WAC derived from the PA intruder analysis (Appendix I) as limits on concentrations in each waste lot.

(3) Modify PA inputs/assumptions in accordance with critical issues identified the PA review attached to TDEC's October 15, 2020 letter to DOE to calculate total-inventory WAC that provide 95% confidence that ARAR concentrations (MCL, AWQC, etc.) are not exceeded, that the $1x10^{-5}$ ELCR threshold is met, and that the HI of 1 is met.

(4) Modify the all-pathways model PA inputs/assumptions for evaluating impacts to Bear Creek surface water to calculate WAC that 1) do not cause exceedance of MCLs or AWQCs, 2) assure compliance with other ARARs, and 3) demonstrate protectiveness for the CERCLA thresholds ($1x10^{-5}$ ELCR and HI less than or equal to 1) for all exposure pathways, including site-specific assessment of the fish-ingestion exposure pathway.

(5) Apply a more thorough analyte list for initial characterization efforts of individual waste lots, modified as appropriate based on process knowledge, to

avoid the risk of missing important radionuclides by analyzing a shorter list. Then, scale the analytical list back to those radionuclides determined to be relevant for each waste lot.

(6) Calculate rolling WAC that change as the landfill is filled, as has been suggested for the Nevada National Security Site (NNSS) Area 5 Radioactive Waste Management Site (RWMS). This approach may be useful when there is uncertainty about the radionuclide content of future waste lots. Rolling WAC involves adjusting WAC as waste is disposed to optimize the remaining "radiological capacity" as the facility fills. It requires characterization of all waste disposed, but it provides for efficient use of the resource (landfill) and allows protectiveness to be demonstrated.

68. **Section 2.12.2.3, Page 2-40, 1st paragraph after bullets**
This paragraph states each waste stream will be certified by the generator as complying with all WAC before being allowed to send waste to EMDF. DOE Manual (M) 435.1-1 requires implementation of a waste certification program to ensure WAC are met. The program shall designate officials who have the authority to certify and release waste for shipment.

TDEC understands a post-ROD WAC compliance plan will present additional details, but several questions are relevant to the decision in light of lessons learned from EMWMF operations and weakness identified in DOE's July 2020 report, *Enterprise-wide Assessment of the Department of Energy's Packing and Shipping of Radioactive Waste*.[9]

a. Is waste certification authority held by DOE officials or contractor personnel?

b. If waste certification authority resides with personnel employed or subcontracted by the contractor that builds and operates the landfill and staffs the WAC Acceptance Team, what safeguards will be established to minimize potential conflicts of interest, where the same entity controls waste generation; landfill construction, operation and monitoring; waste certification; and waste transportation?

c. Other than contracting, what role does DOE play in the waste certification process?

d. Would DOE be willing to consider more independent review of WAC compliance by trained personnel not employed or subcontracted by the contractor that builds and operates the landfill?

[9] Available at https://www.energy.gov/ea/downloads/enterprise-wide-assessment-department-energys-packaging-and-shipping-radioactive-waste.

69. **Section 2.12.2.3, Page 2-40, 2nd paragraph after bullets**
TDEC and EPA should be involved in defining and approving operations-based WAC. If operational constraints are intended to protect the public and the environment to DOE standards and not CERCLA requirements, the ROD should state such constraints are not being relied on for CERCLA compliance.

70. **Section 2.12.2.3, Page 2-40, Administrative WAC**
This paragraph states hazardous waste must be treated to meet LDRs before disposal. Using mercury as an example, how much contaminant mass would the LDRs allow to be disposed in EMDF?

71. **Table 2.4, Page 2-41, EMDF Administrative WAC**
a. Wherever possible, the table should cite legal requirements rather than Triparty (FFA Party) agreements. Those requirements should be included as ARARs in Appendix A of the ROD, which will become the final agreement upon approval by the FFA Parties.

b. Administrative WAC in Table 2.4 should prohibit onsite disposal of reactor components, process equipment/piping, and laboratory equipment. This would be consistent with the Secretary of Energy's statement during a Congressional hearing on May 6, 2021 that the EMDF is designed to hold low-risk construction waste from building demolition at Y-12 and ORNL.[10,11]

c. The second row should cite the definition of radioactive waste in Tenn. Comp. R. & Regs. § 0400-20-11-.03(21), which specifically excludes transuranic (TRU), high level (radioactive) waste (HLW), spent nuclear fuel (SNF), and 11e(2) byproduct waste. Disposal of TRU waste at EMDF would also be prohibited by Public Law 102-579, The Waste Isolation Pilot Plant [WIPP] Land Withdrawal Act.

d. In addition to listing NRC Class C limits for certain radionuclides in Table 2.4, list all numerical WAC in a single table. This could be in addition to or in lieu of inventory limits in Table 2.5 and intrusion-based activity concentration limits in Table 2.6. The table should include limits for all relevant radionuclides and chemicals, including limits derived from LDRs and other ARARs. TDEC provided a template for such a table for DOE consideration on August 26, 2021.

Criteria for disposal of hazardous waste constituents are presented in WAC for every DOE and commercial low-level radioactive waste (LLRW) facility researched by TDEC, including EMWMF. Some implementation details may be presented in the

[10] Barber, W., 2021, Granholm Backs Oak Ridge Landfill, Hears Portsmouth Contamination Concerns in Budget Hearing, *Weapons Complex Monitor*, v. 32, no. 18, May 7.
[11] Barber, W., 2021, EPA Taking Second Look at Planned New Landfill for Oak Ridge, *Weapons Complex Monitor*, v. 32, no. 27, July 9.

WAC compliance plan, but the EMDF ROD needs to provide more detail regarding waste types to be addressed by the CERCLA remedy. Pending agreement on the ARARs to be included in the ROD, uncertainty remains about administrative WAC.

e. The fourth row of the table should cite Tenn. Comp. R. & Regs. § 0400-20-11-.17(7)(a) in its entirety—not just the sixth paragraph. For example, the fourth paragraph addresses the capability of waste to detonate, decompose explosively, or react with water; and the eighth paragraph addresses infectious material.

f. The fifth row of the table should cite Tenn. Comp. R. & Regs. § 0400-20-11-.17(3)(d), (7)(b)(1), and (7)(b)(3), which should be listed as ARARs in Appendix A in lieu of citing a negotiated agreement.

g. In the last row of the table, DOE should consider adding Tenn. Comp. R. & Regs. § 0400-20-04-.04(1)(uuu) [10 CFR 150.11(a)] as an ARAR. The rule defines "Special nuclear material in quantities not sufficient to form a critical mass." The federal requirement at 40 CFR 761.65(c)(6)(i)(C) should also be considered. It states, "Containers used to store both liquid and non-liquid PCB/radioactive wastes must meet all regulations and requirements pertaining to nuclear criticality safety." This rule is an ARAR in RODs for other DOE CERCLA landfills, including the EMWMF[12] and the Portsmouth On-Site Waste Disposal Facility (OSWDF).[13]

h. In addition, it is reasonable for the ROD to include more detail, or at least commit to providing more detail in the WAC compliance plan. Similar documents provide such information for other CERCLA landfills. For example:

   EMWMF: The WAC attainment plan describes wastes for which a Criticality Safety Evaluation (CSE) shall be performed.[14]

   Portsmouth OSWDF: The WAC implementation plan provides at least three conditions that must be met to maintain nuclear criticality safety.[15]

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[12] *OU-13 Record of Decision for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee* (DOE/OR/01-1791&D3); https://doeic.science.energy.gov/uploads/F.0600.031.0184.pdf.

[13] *Record of Decision for the Site-Wide Waste Disposition Evaluation Project at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE/PPPO/03-0513&D2); https://www.energy.gov/sites/default/files/2015/07/f24/2015%2006-30%20PPPO-03-3018616-15%20FINAL%20ROD%20for%20the%20WD%20Evaluation%20Project%20at%20PORTS.pdf.

[14] *Attainment Plan for Risk/Toxicity-Based Waste Acceptance Criteria at the Oak Ridge Reservation, Oak Ridge, Tennessee* (DOE/OR/01-1909&D3); https://doeic.science.energy.gov/uploads/F.0600.033.0087.pdf.

[15] *Waste Acceptance Criteria Implementation Plan for the On-Site Waste Disposal Facility at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE/PPPO/03-0728&D3); http://edocpub.epa.ohio.gov/publicportal/ViewDocument.aspx?docid=1338381.

72. **Section 2.12.2.3, Page 2-42, Analytic WAC, 2nd paragraph on page**
The D1 ROD cites the PA as the basis for inventory limits intended to protect people if contaminants are released to groundwater and Bear Creek in the future. The D1 ROD is a CERCLA document, but it does not provide WAC for chemicals and radionuclides that are demonstrated to be protective of public health in accordance with the CERCLA threshold criterion. The PA is not a CERCLA document, and it does not address non-radiological contaminants, such as mercury and PCBs. The review attached to TDEC's October 15, 2020 letter highlights the state's concerns about applying the PA as the sole basis for a CERCLA decision.

A letter from DOE to TDEC dated February 4, 2021 (revised March 8, 2021 with no date change) states "the CERCLA process is a separate regulatory path from the DOE O 435.1 process that ensures protectiveness through the PA and CA evaluations, and the development of the WAC will be addressed with the FFA Parties outside of DOE O 435.1 efforts." During July, August, and September 2021, DOE hosted several 60- to 90-minute sessions during which TDEC proposed approaches to develop WAC that satisfy CERCLA's protectiveness criterion in a defensible and transparent manner. The goal of TDEC's recommendations was to derive WAC shown to be protective for groundwater and surface water within EPA's risk management range of $1x10^{-4}$ to $1x10^{-6}$ cumulative ELCR and HI less than or equal to 1.[3] *Update status if appropriate.

The last sentence of the cited paragraph states inventory (WAC) limits in Table 2.5 are the *maximum* public doses allowed by Tenn. Comp. R. & Regs. § 0400-20-11-.16(2) [10 CFR 61.41]. The paragraph should also acknowledge the ARAR states "Reasonable effort shall be made to maintain releases of radioactivity in effluents to the general environment *as low as is reasonably achievable*." As noted in the EPA Administrator's DRD, limits set in accordance with this ARAR can be used in combination with the ALARA approach to produce radionuclide effluent concentrations that would be as stringent as those derived through application of CWA and TWQA regulations, ensuring protectiveness of human health and the environment consistent with CERCLA.

The last sentence of the paragraph also states the public protection annual dose limits derived from Tenn. Comp. R. & Regs. § 0400-20-11-.16(2) [10 CFR 61.41]—i.e., 25 millirem (mrem) to the whole body, 75 mrem to the thyroid, and 25 mrem to any other organ of any member of the public—have been deemed protective under CERCLA by EPA.

TDEC notes a regulation is not *inherently* protective; rather, protectiveness depends on *compliance* with the ARAR. Also, EPA provides an approximate Effective Dose

Equivalent (EDE) of 10 mrem/year to assist with applying this requirement to radiation risk assessment at CERCLA sites.[16]

> Cleanup levels based on some older ARARs that use a 25/75/25 mrem/yr standard (i.e., 25 mrem/yr to the whole body, 75 mrem/yr to the thyroid, and 25 mrem/yr to any other critical organ) may appear to permit greater risk than those based on 15 mrem EDE but on average correspond to approximately 10 mrem/yr EDE, using current risk methodologies.

TDEC provided a template for a WAC table for DOE's consideration on August 26, 2021 that included groundwater pathways analytic WAC based on RESRAD-OFFSITE single radionuclide soil guidelines that are derived from ELCR calculations employing radionuclide slope factors.

TDEC recognizes that DOE must also comply with DOE Orders and other Directives and may choose to apply Derived Concentration Standards (DCS) as metrics for operating a landfill, but DCS are not directly relevant as a basis for demonstrating compliance with CERCLA threshold criteria such as the risk management range. If DOE wants to base a CERCLA protectiveness demonstration, in part, on DOE Directives, those Directives must be listed in the ROD as to be considered (TBC).

Landfill wastewater discharge limits based on the CWA and the 10-millirem (mrem) EDE supported by EPA guidance, per the EPA Administrator's DRD, will be more protective than DCS values, which are based on an annual dose limit of 100 mrem. All landfill wastewaters must be treated using technologies agreed by the FFA Parties to meet discharge limits that are protective of human health and the environment under CERCLA for each contaminant present.

Additionally, DCS values establish media-specific concentration limits for a single exposure pathway, such as ingestion of water or inhalation of air. They do not include all relevant and applicable exposure pathways that would be considered under CERCLA, such as fish ingestion. Nor do DCS address concerns for bioaccumulation, biomagnification, or chemical toxicity which are pertinent to projected EMDF contaminants such as mercury and PCBs. Moreover, the DOE standard clearly states that DCS "are not intended to be used to infer the dose to members of the public, nor to demonstrate compliance with DOE radiation protection dose limits."

73. **Section 2.12.2.3, Page 2-42, Analytic WAC, 2nd paragraph on page & Table 2.5**
Table 2.5 presents inventory limits for only three highly mobile radionuclides, which is not adequate, as outlined in the review attached to TDEC's October 15, 2020 letter and summarized in Comment *67 (Section 2.12.2.3, Page 2-40, 2nd bullet). Inventory limits

[16] See Footnote 11 in *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination*, OSWER No. 9200.4-18, August 22, 1997. Available at https://semspub.epa.gov/work/HQ/176331.pdf.

may be warranted for additional radionuclides, including those listed in Attachment 1 to TDEC's June 15, 2020 WAC comments. The table provides a list of radionuclides that may need inventory limits to protect people who eat fish caught downstream of EMDF in the future. TDEC provided a template for such a table for DOE consideration on August 26, 2021.

74. **Section 2.12.2.3, Page 2-42, Analytic WAC, 2nd paragraph on page**

a. The first sentence of the cited paragraph states the PA evaluated a conservatively estimated radionuclide inventory to predict potential exposure/dose to future hypothetical receptors. TDEC understands the PA introduces some conservatism in the total inventory limit WAC by assuming 2.2 million cubic yards (cy) of waste will be placed in EMDF, even though the volume of waste projected for disposal is only 1.6 M cy.

   TDEC appreciates ongoing efforts to develop WAC shown to be more protective in a CERCLA context because TDEC remains concerned about the inventory uncertainties acknowledged in the PA. In part, this is because some waste lots projected for disposal have yet to be fully characterized. Another concern is the use of data from unspecified EMWMF waste lots derived primarily from ETTP to estimate radionuclide concentrations in future EMDF waste streams to be generated primarily at Y-12 and ORNL. This is particularly concerning given that radioactivity is tracked for only 13 radionuclides at EMWMF. An additional concern is that EMDF WAC will be developed based on assumptions that future waste lots will contain lower amounts of radionuclides than might actually be encountered. In this case, it is unclear that future waste characterization efforts will adequately address potential risks to public health and the environment, given that such efforts are outside the scope of this decision and WAC compliance will be addressed in a future (post-ROD) document. The result could be more radioactivity in EMDF for potential release in the future. Even more concerns regarding inventory uncertainties are provided in a review of the PA attached to TDEC's October 15, 2020 letter to DOE.

b. Based on a workshop held on July 22, 2021, TDEC understands a "waste lot" will be the unit of the waste used to determine WAC compliance for disposal in the EMDF and the ROD will be revised to clarify this point. "Waste lot" should be defined or explained in the ROD. Discussion of "waste packages" may still be warranted in other contexts.

   The last sentence in the paragraph states the PA did not evaluate any future residential scenario in which there is direct exposure to the waste. However, TDEC remains concerned erosion with the potential to degrade the cap was not modeled realistically. Moreover, a resident need not have a basement or directly

contact the waste to be exposed to radiation. For example, if the waste is just below a basement floor, there could be exposure without direct contact.

75. **Section 2.12.2.2, Page 2-43, 4th full paragraph**
Modify the first sentence of the cited paragraph to read:

> The basis for WAC use and implementation will be detailed in the WAC Compliance Plan, which will be an FFA primary document with a schedule milestone in Appendix E of the FFA.

76. **Section 2.12.2.3, Page 2-43, 2nd full paragraph on page**
The first sentence of the cited paragraph states intrusion-based WAC concentration limits do not dictate the amount of a radionuclide allowed for disposal because they are evaluated (averaged) for the landfill as a whole.

Waste acceptance limits based on intrusion scenarios should be hard limits on a per-package or per-truckload basis since these scenarios are based on exposure to waste in discrete areas of the landfill. Based on the information presented in the D1 ROD, some of these limits would allow large inventories of radionuclides to be disposed, since DOE has proposed to limit the total inventory limits for only the three radionuclides listed in Table 2.5.

Total inventory limits are needed for additional radionuclides to protect from future risks posed by contaminants transported in groundwater and/or surface water. For example, the U-238 limit in Table 2-6 would allow for disposal of much more U-238 than is in the projected inventory of waste to disposed at EMDF, and it would also allow for disposal of much more uranium than was disposed in the BCBG. TDEC will continue working with DOE to develop more complete and defensible WAC based on CERCLA requirements and guidance.

77. **Section 2.12.2.3, Page 2-43, 3rd full paragraph on page**
The third sentence in the paragraph requires clarification. It states activity concentration limits in Table 2.6 could allow a much greater inventory than is projected, but the limits will be applied on individual waste lots to optimize use of the facility. Explain how activity concentrations that could allow more than the projected radionuclide inventory are "limits." Also, clarify where it is shown that maintaining a sum-of-fractions at 1 for the entire facility ensures the CERCLA risk range is met at closure, as stated in the last sentence of the paragraph.

78. **Section 2.12.2.3, Page 2-43, 4th full paragraph on page**
The last sentence in the paragraph states the WAC Compliance Plan will outline a method for managing a situation in which waste proposed for disposal contains a

radionuclide that had not been previously evaluated through PA modeling or included in the WAC.

TDEC is concerned that radionuclides for which WAC have not been proposed may be present in a waste lot but not discovered if waste characterization is driven solely by existing WAC. For this reason, TDEC recommends applying a more thorough analyte list for *initial* characterization of individual waste lots and/or particular waste streams originating from various processes, modified as appropriate where process knowledge can be used to rule out the presence of some radionuclides. Waste Handling Plans (WHPs) for waste that may be disposed in EMDF would specify a thorough analyte list for initial characterization of relevant portions of the waste lot, but they would also allow use of an optimized analytical suite for the remainder of the waste lot if supported by the data.

Adopting this approach as part of the waste management remedy selected by the EMDF ROD would minimize the chance of failing to account for unexpected radionuclides in the waste. As noted in the PA, some radionuclides were not evaluated precisely because of a lack of data. Therefore, process knowledge may not be sufficient to make protective waste characterization decisions on a project-specific basis.

79. **Section 2.12.2.3, Page 2-43, last paragraph on page**
The paragraph states DOE will maintain the landfill in perpetuity, as required by CERCLA. Given DOE's reliance on WAC derived from the PA, which was completed under DOE Orders, the paragraph should also point out that WAC provide protection beyond the timeframe during which CERCLA reviews, monitoring, and corrective actions are expected to occur. Although the PA is based on a performance period that extends 1,000 years after closure of the landfill, it also assumes institutional controls end 100 years after closure.

80. **Table 2.6, Page 2-44**
   a. Add a footnote clarifying the maximum volume over which the limits in the table apply.

   b. Activity concentration limits presented in the table would allow radionuclides to comprise a significant portion of the total landfill mass. For long-term protectiveness, inventory limits like those presented in Table 2.5 may be warranted for isotopes of uranium, thorium, and others that contribute substantially to the total mass allowed by the concentration limits in Table 2.6.

   c. As a primary COC at Y-12 found in multiple buildings planned for demolition, beryllium metal may also warrant limits. The EMWMF WAC includes a requirement

for beryllium to be wetted, double-bagged in quantities not to exceed 40 pounds and shipped separately or with adequate soil.

d. According to the D5 RI/FS (Table 2-9), beryllium is among the chemicals which have been found in the waste disposed at EMWMF. The RI/FS also projects that beryllium will be in the EMDF waste inventory, and considerable beryllium contamination is present at Y-12.[17] However, the only criterion listed in the D1 ROD is an intrusion-based limit for beryllium-10 (Table 2.6). The concern is potential harm from inadvertent intrusion, given the documented role beryllium plays in lung diseases among DOE workers.[18]

e. Separately, WAC may be warranted to manage beryllium's potential to pose nuclear criticality safety hazards due to its function as a neutron moderator and a neutron reflector, both of which increase the likelihood of fission.

DOE established requirements for beryllium at CERCLA landfills, including EMWMF and the Portsmouth OSWDF, and it is a component of the WAC at DOE's NNSS and WIPP, as well as the Energy*Solutions* facility in Utah and the Waste Control Specialists (WCS) facility in Texas.

81. **Section 2.12.2.3, Page 2-45, 1st paragraph after bullet near top of page**
TDEC and EPA should be involved in defining and approving operations-based WAC. Solid and hazardous waste rules include substantive operational requirements for permitted facilities. The D1 ROD provides no justification for ceding all authority on physical WAC and other operations-based protections to DOE.

Alternatively, the ROD should explain how EMDF operations will differ from EMWMF, where operations-based criteria are part of the facility WAC. Experience at EMWMF demonstrates regulatory approval of operations controlling precipitation run-on/run-off and physical WAC impacting the long-term stability of the waste should involve regulatory review and approval. Any waivers from such requirements should be agreed by TDEC and EPA. If operational constraints are intended to protect the public and the environment to DOE standards and not CERCLA requirements, the ROD should state such constraints are not being relied on for CERCLA compliance.

82. **Page 2-45, Mercury Management Approach**
a. This section lacks the necessary detail for a ROD. As noted in TDEC's general comments, the absence of specific remediation goals in surface water as required by 40 CFR § 300.430(f)(4)(iii)(A) prevents proper evaluation of this section.

[17] URS I CH2M Oak Ridge LLC (UCOR), 2015, *Considerations for Characterization, Pre-demolition, and Disposition of Y-12 Mercury-Contaminated Debris, Oak Ridge, Tennessee*, UCOR-4653/R1, June.
[18] For example, see https://www.cdc.gov/niosh/ocas/ocaseeoi.html.

b. The approach to mercury management in the D1 ROD states DOE will dispose of D009-listed mercury waste offsite, so D009 waste should be excluded by the administrative WAC in Table 2.4.

c. Although the D1 ROD would prohibit disposal of D009-listed mercury waste, large volumes of untreated mercury-bearing waste could be disposed at concentrations below the LDR. Such waste should be treated and/or disposed offsite, or the ROD should indicate how much mercury the EMDF will accept.

d. Bioaccumulative parameters such as mercury require loading limits as well as concentration limits to protect aquatic life. A loading limit for mercury discharges to Bear Creek is necessary.

83. **Page 2-45, Mercury Management Approach, 2nd bullet, 1st sub-bullet**

a. This text disregards Bear Creek's inclusion on the state's List of Impaired and Threatened Waters for mercury, thereby requiring application of Tenn. Comp. R. & Regs. § 0400-40-03-.06 for antidegradation. An antidegradation calculation and approach must be developed to discharge mercury into Bear Creek, as well as PCBs, which are also bioaccumulative.

b. In addition to mercury and PCBs, the ROD should also acknowledge that Bear Creek is impaired for cadmium and nitrate/nitrite.

84. **Page 2-45, Mercury Management Approach, 2nd bullet, 2nd sub-bullet**

The second sub-bullet references meeting the "most stringent applicable water quality criteria, including recreational, with consideration of the stream mixing zone at the point of discharge."

a. Tenn. Comp. R. & Regs. § 0400-40-03-.05(2) should be added to the ARAR list. This rule includes seven restrictions for the application of a mixing zone that must be considered. In addition, a mixing zone cannot be applied to the discharge of bioaccumulative pollutants for which risk-based factors are exceeded.

b. How will it be determined which parameters require discharge limits? In the past five years, more than 250 constituents have been analyzed in EMWMF leachate.

c. Many constituents have no state or federal AWQC. When developing the most appropriate discharge limits and ARAR list for the EMDF ROD, DOE must consider all state and federal regulations, including but not limited to effluent limitation guidelines, state anti-degradation regulations, Best Available Technology Economically Achievable,[19] Water-Quality Based Effluent Limit (WQBELs), and Technology Based Effluent Limits (TBELs).

d. Per the EPA Administrator's decision, "the point of compliance for meeting the final effluent limits must be at the point of discharge." If the proposed discharge point is Bear Creek or one of its tributaries, the limitations of a mixing zone must be considered.

e. The 7Q10 and 30Q5 flow conditions in Bear Creek near the landfill must be calculated to evaluate the assimilative capacity for each parameter.[20]

f. AWQC are concentration limits in the state regulations but implemented as loading limits for bioaccumulative parameters. In the ROD, concentration limits must be converted to loading limits for all bioaccumulative parameters.

g. Water quality criteria for EMDF landfill wastewater should include whole effluent toxicity testing to manage uncertainties associated with numerous COCs with potential toxic effects.

85. **Page 2-45, Mercury Management Approach, 2nd bullet, 3rd sub-bullet**
Elaborate on water management practices that could be considered to "reduce the volume of water needing treatment."

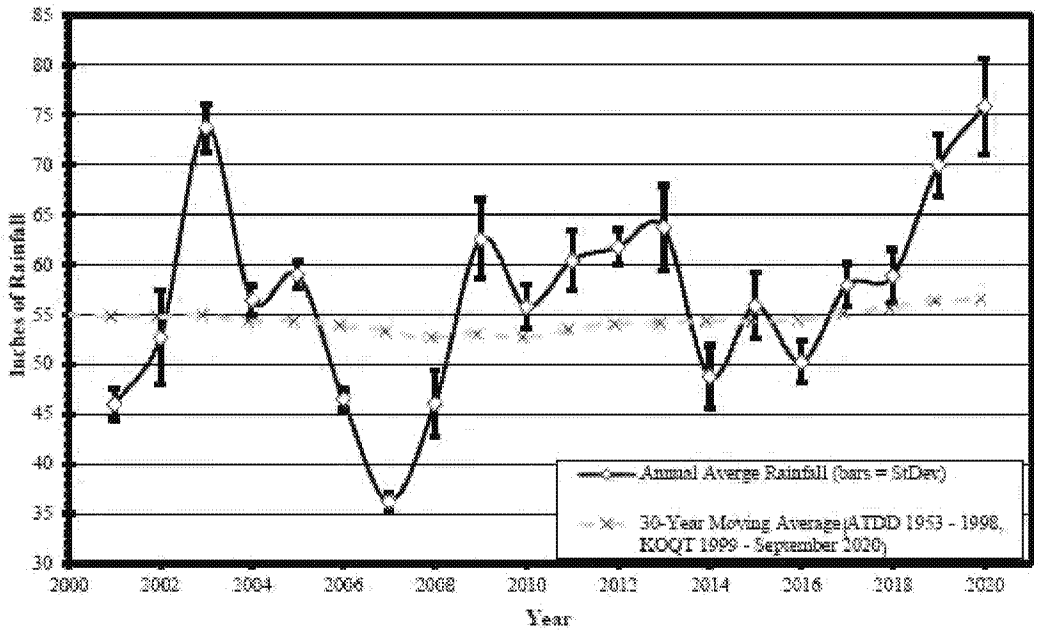
86. **Section 2.12.2.4, Page 2-46, 1st paragraph**
TDEC appreciates prioritization of minimizing the disposal of clean material in the proposed EMDF. However, the ROD should clarify how a goal within the document meets this commitment when waste-generating projects are not within the scope of the EMDF ROD, as stated in Section 2.4 (p. 2-11).

87. **Section 2.12.2.4, Page 2-46, 2nd paragraph**
a. The waste disposal remedy selected in the ROD must address CERCLA's preference for cleanup through active treatment of all landfill wastewater.

b. What are DOE's plans for landfill wastewater storage capacity at EMDF? Regarding design considerations, the March 4, 2021 EMDF Leachate/Contact Water Treatment Overview states, "Minimum requirement is a 25-year 24-hour storm

[19] Set in accordance with Tenn. Comp. R. & Regs. § 0400-40-05-.09.
[20] 30Q5 = lowest 30-consecutive-day average flow that occurs (on average) once every 5 years; 7Q10 = lowest 7-consecutive-day average flow that occurs (on average) once every 10 years.

event, but additional consideration has been given to both 100-year 24-hour storm and historical precipitation" and "The most challenging storage tank/collection pond fill scenarios are driven by the back-to-back storm conditions from 2003." 2003 was an extremely wet year, but the past two years have experienced similar rainfall. Per the 2021 RER (see chart below), rainfall in federal Fiscal Year (FY) 2020 was 20 inches greater than the 30-year average. Precipitation levels similar to those in 2003 are no longer extreme events, but rather the norm, and this must be taken into consideration for storage and treatment design.



88. **Section 2.12.2.4, Page 2-46, 4th paragraph**

a. The text states radiological discharge limits comply with the 10^{-5} risk. The ROD must document how this compliance is demonstrated or cite a document in the Administrative Record that provides the assessment.

b. The text states, "Compliance with ARARs is required at the nearest point of public exposure, which is downstream from the facility." Revise the wording for consistency with the Dispute Resolution Decision (p. 13):

> While the point of exposure to radionuclides used for identifying risk and setting appropriate effluent limits may be downstream of the discharge point (which has not yet been determined), the point of compliance for meeting the final effluent limits must be at the point of discharge.

c. The EPA Administrator's DRD is specifically referencing a point of compliance for discharge limits, whereas this section of the D1 ROD is more broadly referencing

ARARs associated with "discharge of radionuclides contained in landfill wastewater." The next sentence cites the DRD.

How different are these two issues, or are they one in the same? If the latter, this text should be edited to reflect the intent of the DRD, rather than taking credit for several kilometers of stream in order to comply with ARARs.

89. **Section 2.12.2.6, Page 2-47**
Consider moving the last paragraph of the section to the beginning of the section to discuss activities in chronological order.

90. **Section 2.12.4, Page 2-49, 1st paragraph**
The text states EMDF construction at the CBCV site provides onsite disposal that will be protective of human health and the environment and waste disposal in EMDF will protect human and ecological receptors. The ROD must document how this protectiveness is demonstrated in accordance with CERCLA or cite a document in the Administrative Record that provides the demonstration(s).

91. **Section 2.12.4, Page 2-49, 2nd paragraph**
Consider providing examples of how wetland impacts might be mitigated (restoration, enhancement, preservation, creation, etc.) and/or citing the page number where the reader can find the ARARs related to wetland mitigation (e.g., page corresponding to p. A-7 in the D1 ROD).

92. **Section 2.13.1, Page 2-50, 1st paragraph**
The text states the selected remedy [EMDF construction and operation] will be protective of human health and the environment. The ROD must document how this protectiveness is demonstrated in accordance with CERCLA or cite a document in the Administrative Record that provides the demonstration(s).

93. **Section 2.13.2, Page 2-50, last paragraph on page**
This comment may not warrant a revision in the document, but TDEC agrees identification of ARARs helps ensure the selected remedy is protective of human health and the environment, as stated in the first paragraph in the section. It is unclear why the cited paragraph highlights only two TDEC regulations used to support development of landfill wastewater discharge limits when the first paragraph on p. 2-51 states all ARARs are presented in Appendix A. Modify the last sentence to state limits on radiological discharges during operations will ensure protection of human health and the environment in compliance with TDEC water quality criteria regulations for carcinogens in Footnote (c) of Tenn. Comp. R. & Regs. § 0400-40-03-.03(4)(j), which the EPA Administrator determined is a relevant and appropriate requirement.

94. **Section 2.13.2.1, Page 2-51, Waiver to TSCA 40 CFR 761.75(c)(4)**
DOE seeks a waiver of 40 CFR 761.75(b)(3) under 40 CFR 761.75(c)(4). The waiver justification is incomplete and should include a defensible demonstration that risks to the public via contaminant transport by surface water are acceptable.

Toxic Substances Control Act (TSCA) 40 CFR 761.75(b)(3) states in part, "Floodplains, shorelands, and groundwater recharge areas shall be avoided. There shall be no hydraulic connection between the site and standing or flowing surface water." On p. 2-52, the waiver of the requirement for no hydraulic connection of the site to surface water is justified by suggesting the rule is intended to separate waste from groundwater following landfill construction. The requirement is also intended to separate waste and surface water to minimize contaminant transport. The rule protects the public from contaminants released above the liner and subsequently transported by surface water.

95. **Section 2.13.2.1, Page 2-52, 4th paragraph on page**
TSCA 40 CFR 761.75(b)(3) for which DOE is seeking a waiver under 40 CFR 761.75(c)(4) requires "There shall be no hydraulic connection between the site and standing or flowing surface water." The cited paragraph states the objective of this requirement will be met by landfill construction that separates water from waste. However, the ROD (p. 2-46, second paragraph) also states EMDF landfill wastewater may be discharged directly to Bear Creek or a tributary without treatment. Considering this, explain how landfill construction will separate water from waste.

96. **Section 2.13.2.2, Page 2-54, 3rd paragraph**
The text states WAC will ensure human and environmental protectiveness are met per RAOs. The ROD must document how this protectiveness is demonstrated in accordance with CERCLA or cite a document in the Administrative Record that provides the demonstration(s).

97. **Section 2.13.2.2, Page 2-54, 4th paragraph on page**
For accuracy, change "unique" to "specific" or a similar word. Descriptions throughout the draft ROD indicate EMDF will be constructed and operated similarly to the existing EMWMF, so it is not accurate to describe EMDF as a unique CERCLA remedy.

98. **Section 2.13.2.3, Page 2-54, 2nd paragraph in section**
In addition to the EPA Administrator's DRD, the ROD should cite the final *Focused Feasibility Study for Water Management for the Disposal of CERCLA Waste on the Oak Ridge Reservation, Oak Ridge, Tennessee* (FFS), where the technical methodology for determining radiological discharge limits will be documented.

99. **Section 2.13.4, Page 2-55, 2nd paragraph**
Consider removing this paragraph or clarifying the purpose for including the two statements it contains. Text throughout the ROD (e.g., p. 2-11, third and fourth paragraphs; p. 2-17, first paragraph of Section 2.8; and Section 2.13.5) already explains exclusions from the EMDF project scope.

As presented in Section 2.13.4, the cited paragraph contradicts the premise for selecting onsite disposal outlined in the preceding paragraph and the previous section. If onsite disposal represents the most cost-effective alternative and offers economy of scale, the same benefits would accrue from consolidating decisions about resource recovery and recycling, if not waste treatment. It may make sense to remove this paragraph since the ROD scope is waste disposal rather than a more holistic approach to waste management.

100. **Section 2.13.5, Page 2-56, 1st full paragraph on page**
The single sentence in the cited paragraph states landfill wastewater treatment is a key remedy component that will reduce the *toxicity* of the waste. For accuracy, revise the text to state landfill wastewater treatment would reduce the *mobility* of contaminants released from the waste.

101. **Section 2.13.6, Page 2-56 and Section 2.14, Page 2-56, 1st sentence in section**
For consistency with other sections of the ROD, these sections should state 5-year reviews will be required *in perpetuity*. The phrase is included in Sections 2.6.2 (p. 2-16), 2.12.2.3 (p. 2-43), 2.12.2.6 (p. 2-47), and Table 2.7 (p. 2-48).

102. **Section 2.14, Page 2-56, 3rd paragraph in section**
    a. This paragraph indicates DOE completed three additional evaluations in response to public comments. The document provides additional details about two of the evaluations: impacts of offsite waste disposal on ETTP reindustrialization and the production of greenhouse gases associated with offsite waste transportation. However, the document provides no such detail about the third evaluation: a re-estimation of onsite and offsite disposal costs. Such information should be included as a subsection or appendix in the ROD or another document to be included in the administrative record because it addresses a CERCLA balancing criterion and public comments on the Proposed Plan. For example, it would support the response to sub-comment #3 on p. 3-75.

    b. Remove the word "ongoing." At the time a final ROD is signed, it will not be accurate to characterize delays in a decision as ongoing.

103. **Section 2.14.2, Page 2-59**
TDEC agrees offsite waste transportation would generate more greenhouse gas emissions than transportation associated with onsite disposal. DOE estimates excess

emissions would be 113,143 carbon-dioxide-equivalent metric tons (Mt CO_2e) over the 22-year project life, which is 5,143 Mt CO_2e per year. For context, this is a relatively small loading of greenhouse gas, considering employees commuting to and from Y-12 generate about 3.5 times that amount, based on the most recent publicly available data from FYs 2008 and 2012 (17,447 and 18,005 Mt CO_2e per year, respectively).[21]

Consider updating the information in Section 2.14.2. For example, the citation of EPA's March 2018 emission factors for greenhouse gas inventories could be updated to reflect values published in April 2021. Similarly, this section cites a June 2019 version of EPA's calculator for greenhouse gas equivalencies, which could be updated to the more recent version, dated March 2021. Updating this section would result in a moderate increase (about 20%) in the projected emissions associated with transportation to off-site facilities, but there would be negligible change (less than 1%) in the equivalencies presented.

104. **Section 2.14.3, Pages 2-60 & 2-61**
Following nearly two decades of effort to determine groundwater levels under the existing EMWMF landfill, uncertainties remain about the position of the water table with respect to the geologic buffer under the liner system.

a. The EMDF ROD should commit to the development of a clear plan for monitoring the seasonal high water table under the EMDF with more certainty. Given the plan to build the landfill in phases, it should be clearly state how the seasonal high water table will be monitored under the knoll, where pre-construction water levels are high, as well as under lower parts of the landfill, where fill placement and waste loading may restrict groundwater discharge—a lesson learned from EMWMF.

b. Section 2.14.3, Page 2-61, 2nd & 3rd bullets:
Piezometer data should be collected prior to clearing the area and installing the temporary liner system. Clearing the study area and installing the temporary liner system may independently impact the seasonal high water table by reducing evapotranspiration and direct recharge. Without controlling for both effects, it will be difficult to distinguish the liner impact from the impact of clearing the area.

c. Section 2.14.3, Page 2-61, 8th bullet:
The ROD should elaborate on what is meant by "adjustment." Provide additional explanation of how this adjustment may occur.

[21] Y-12 National Security Complex, 2012, *Y-12 National Security Complex FY 2013 Site Sustainability Plan*, U/IA-451/Rev.1, December, p. 1-6. Available at https://digital.library.unt.edu/ark:/67531/metadc844673/.

Part 3: Responsiveness Summary

105. **Page 3-4, 2nd line on page**
It would be more accurate to replace "which had members from TDEC present" with "which had a TDEC representative present."

106. **Page 3-4, Summary of Comments and Responses, 2nd paragraph**
The cited text (and text on p. 2-29) states DOE received comments from 194 individual commenters. The compilation of comments DOE to TDEC on January 16, 2019 included comments from 195 entities (individuals or organizations), accounting for multiple comments from five entities. TDEC and DOE should compare notes to ensure all comments are considered.

107. **Page 3-4, Summary of Comments and Responses, 3rd paragraph**
In this comment, *comments* and *commenters* are italicized to emphasize the distinction because some commenters provided more than one comment.

The cited text on p. 3-4 states "a majority of the *comments* were in favor of the preferred remedy." Revise the text to reflect that a larger number of *comments* expressed opposition or neutrality, rather than support for the preferred alternative presented in the Proposed Plan. Based on TDEC's evaluation, 102 *comments* supported onsite disposal, while a larger number expressed opposition (91) or neutrality (59), based on the information available at the time.

Alternatively, revise the text for consistency with p. 2-29 which states "the majority of *commenters* were in favor of the preferred remedy." In this case, it would be more accurate to recognize the nearly even split between the 101 *commenters* (52%) supporting the preferred remedy and the 94 *commenters* (48%) who were opposed or neutral, based on the information available at the time.

Qualitatively, commenters who were opposed or neutral wrote longer, more substantive comments. Based on the number of words, comments from neutral entities averaged 15 times the length of comments from supporters, while comments from opposed entities were eight times longer. On average, both groups addressed six times the number of issues as commenters who supported the preferred remedy. Issues addressed included CERCLA evaluation criteria, state key concerns, and other topics.

108. **Page 3-8, 1st paragraph**
This paragraph states the PA and CA demonstrate the long-term protectiveness of EMDF as a LLW landfill, but the D1 ROD does not provide sufficient information to support this statement. DOE completed the PA and CA under internal Directives. They are *not* CERCLA documents. The state appreciates DOE completing the PA and CA

through a process independent from CERCLA and obtaining a PDAS for building a radioactive waste disposal landfill. However, the state requires a demonstration of CERCLA protectiveness and compliance with ARAR pertaining directly to the CERCLA threshold criteria.

Revise the text to explain how CERCLA *protectiveness* has been demonstrated. Alternatively, clarify the PA demonstrates long-term *performance* of the landfill for radionuclide disposal and the CA evaluates the collective impact of potential exposure to radionuclides from EMWMF, EMDF, and all other ORR sources that might, in combination with the landfills, contribute to radiation doses to members of the public.

109. **Page 3-69, Response #4**
Like statements throughout the D1 ROD, the response indicates decisions on mercury treatment or waste volume reduction are responsibilities of the waste generating projects and associated decision documents. The ROD, including this response, should 1) describe which CERCLA reports will document such efforts and 2) acknowledge generation of mixed CERCLA waste will be reported in conjunction with the Site Treatment Plan.

110. **Page 3-76, Response #3**
The response states mercury contamination is a national/global concern due to atmospheric deposition of mercury from non-DOE sources. The text should be corrected to acknowledge legacy mercury operations and waste disposal on the ORR.

111. **Page 3-96, Response #1, 1st sentence**
The sentence states "data from nearly 1000 wells in Bear Creek Valley support the conclusion that any contamination in the valley cannot reach residential areas." Based on DOE's publicly available database, the OREIS, there are 407 wells in BCV, 197 of which are active.

a. Correct the response to reflect the actual number of wells DOE is relying on to support the statement.

b. TDEC requests a list of the BCV wells DOE is relying on to support the statement with an indication of which wells remain available for groundwater monitoring.

c. Wells may provide data on current and past groundwater conditions, but the response should be revised to clarify how the data from the wells "support the conclusion that any contamination in the valley cannot reach residential areas."

d. While TDEC is not aware of any current risks posed by off-site migration of groundwater from BCV, uncertainty remains regarding potential future risks. Has a

regional groundwater flow model evaluated potential off-site transport via deep groundwater flow zones as is being done for Bethel Valley and Melton Valley?

112. **Page 3-96, Response #1, 2nd sentence**
The sentence states the law requires groundwater monitoring to identify releases around any disposal facility. TDEC agrees and notes the ROD, including this response, should commit to full compliance with those legal requirements.

EMWMF has operated since 2002, and TDEC continues working to bring that landfill into compliance with legal requirements in the ROD. Although the FFA Parties have discussed the issue for several years, DOE has not initiated groundwater monitoring southwest of the landfill—a well-documented possible direction of groundwater flow through soil and bedrock fractures on the ORR.

113. **Page 3-113, Response #1, 2nd to last sentence**
The response states safety-basis WAC will consider nuclear criticality issues. The response could be strengthened by committing to address nuclear criticality safety through the addition of legal requirements, identified in previous comments above, into the ROD.

114. **Page 3-130, Response near end of page**
    a. The response states "Current mercury levels in Bear Creek are on the order of those in reference streams throughout the state." While TDEC Division of Water Resources data indicate the presence of mercury in fish throughout Tennessee, mercury levels in Bear Creek fish are two to three times higher than elsewhere in the state. For rock bass, an indicator species monitored by DOE in Bear Creek, mercury levels are about five to six times higher than those in fish from other parts of Anderson and Roane Counties.[22] Include the fish-tissue mercury concentrations comparisons in this response.

    b. The response also states, "DOE will control levels of mercury in landfill wastewater through treatment if necessary to meet Clean Water Act limits, prior to discharge to Bear Creek." Remove "if necessary" from the response. The EMDF ROD should commit to the full treatment of radionuclides and hazardous/toxic chemicals in all EMDF landfill wastewater using technologies agreed by the FFA Parties.

115. **Page 3-147, 1st bullet, Response**
The response states, "DOE will take all practical measures to remove mercury before waste generation and send that mercury offsite to treatment/storage/disposal facilities." How will DOE remove mercury from debris *after* generation?

[22] Thomason, C., 2019, *Mercury in Fish Tissue Throughout the State*, internal TDEC correspondence, September 18.

116. **Page 3-151, 3rd paragraph**
The commenter asks whether EMDF would have capacity for unplanned and emergency cleanups of waste not currently projected for disposal, including unlined burial grounds needing remediation in the future. DOE's response indicates there is a volume contingency and "there would be space for some." The ROD should clarify whether EMDF includes adequate capacity to remediate existing disposal trenches or whether additional landfill space might be required in the future.

117. **Page 3-153, 1st bullet**
The commenter states a primary goal should be reducing the volume of waste. The response indicates other projects *can consider* implementing such technologies before disposing of waste in the EMDF. It also states the ROD *does include a commitment* to waste minimization.

As noted in a previous comment, the text of Section 2.12.2.4 (p. 2-46) falls short of a strong commitment to volume reduction and other forms of waste minimization. The ROD should clarify how a goal in the EMDF ROD meets the promised commitment when waste-generating projects are not within the scope of the EMDF ROD, as stated in Section 2.4 (p. 2-11).

118. **Page 3-174, Comment 168.26**
The comment cites a statement in the Proposed Plan that "some residual levels of mercury associated with building rubble, soils and drained equipment are proposed for onsite disposal." The response states, "plans for segregating mercury prior to and during demolition are the responsibility of the generating project and are not addressed in this disposal decision."

a. The ROD, including this response, should commit to the development and implementation of clear, documented requirements for waste generators to assure ARARs are met.

b. Will waste with visible beads of mercury be accepted at EMDF?

119. **Page 3-195, Response to Comment 8**
The commenter states, "more explanation is needed how segregation will be performed to prevent 'clean' waste from being disposed at the EMDF and using up available space." The response states waste segregation and volume reduction are very high priorities for DOE on the ORR and "DOE is committed to the reduction of waste volumes going to EMDF through waste segregation and maximizing recycling."

As noted in a previous comment, the text of Section 2.12.2.4 (p. 2-46) falls short of a strong commitment to volume reduction and other forms of waste minimization. The ROD should clarify how a goal in the EMDF ROD meets the commitment when waste-

generating projects are not within the scope of the EMDF ROD, as stated in Section 2.4 (p. 2-11).

Appendix A: Applicable or Relevant and Appropriate Requirements

120. **ARARs – General Comment**
Appendix A omits requirements the FFA Parties agreed upon and documented in Appendix G of the RI/FS Dispute Resolution Agreement dated December 7, 2017. Most of the following comments focus on such omissions.

121. **Waste Management**
   a. Examples of missing requirements include those pertaining to waste management that are presented in the DRA Appendix G Sections 7.2.2, Storage, and 7.2.3, Waste Segregation. Such hazardous waste management requirements must be incorporated in the ROD for a landfill planned to receive hazardous waste in compliance with the Resource Conservation and Recovery Act (RCRA).

   b. If DOE no longer plans to construct and operate EMDF in compliance with RCRA, the ROD or another document in the CERCLA Administrative record must provide calculations demonstrating that EMDF landfill wastewater will not be hazardous.

122. **Long-term Stability**
Should Tenn. Comp. R. & Regs. § 0400-20-11-.08(3)(b)(4) be included as an ARAR? This rule states:

> Analyses of the long-term stability of the disposal site and the need for ongoing active maintenance after closure must be based upon analyses of active natural processes such as erosion, mass wasting, slope failure, settlement of wastes and backfill, infiltration through covers over disposal areas and adjacent soils, and surface drainage of the disposal site. The analyses must provide assurance there will not be a need for ongoing active maintenance of the disposal site following closure.

123. **Drinking Water Protection**
Appendix A omits Safe Drinking Water Act (SDWA) standards. Preliminary EMDF ARAR text documented in DRA Appendix G states this remedial action is not being conducted in or on surface or groundwater; therefore, the MCLs are not ARARs. Yet, the basis of the inventory-limit analytic WAC proposed in the D1 ROD is use of groundwater from a nearby well. If the PA analytic WAC applied in the ROD to satisfy the CERCLA protectiveness criterion are based on use of groundwater as tap water, how could MCLs not be ARARs?

As explained in the D1 ROD, an RAO is necessary to ensure 15 ft of separation between EMDF waste and the seasonal high water table because of shallow natural groundwater levels documented in TM-1 and TM-2. The D1 ROD also describes plans to build the landfill immediately adjacent to several streams.

SDWA standards (e.g., MCLs) must be ARARs to ensure the remedy protects water resources—one of the most important substantive requirements of any landfill permit. Arguably, most of the state's seven key concerns documented in the Proposed Plan relate to ensuring remedy protectiveness for exposure to groundwater. The fourth (D4) and fifth (D5) drafts of the RI/FS include an RAO to prevent adverse impacts to water through meeting SDWA MCLs in waters that are current or potential sources of drinking water.

124. **Corrective Action Practicability**
Tenn. Comp. R. & Regs. § 0400-12-02-.03(2)(e)(1)(i)(III) is cited on p. A-19, but the D1 ROD needs to provide information documenting the required demonstration of the technical practicability of a corrective action program at the site.

125. **Corrective Action Practicability**
Consider including other parts of Tenn. Comp. R. & Regs. § 0400-12-02-.03 as ARARs because they address floodplains, wetlands, seismic considerations, areas of complex hydrogeology, corrective action buffer zones, and surface waters.

126. **Corrective Action Practicability**
Tenn. Comp. R. & Regs. § 0400-40-03-.06(2)(a),(b),(c) are cited. Should Tenn. Comp. R. & Regs. § 0400-40-03-.06(2) also be included as an ARAR?

127. **Groundwater Classification and Criteria**
Consider including portions of Tenn. Comp. R. & Regs. §§ 0400-40-03-.07 and 0400-40-03-.08 as ARARs.

128. **Post-closure Stability**
Based on the D1 ROD, EMDF WAC relies in part on NRC Class C limits. Therefore, the ROD should include as ARARs key requirements from NRC-compatible rule Tenn. Comp. R. & Regs. § 0400-20-11-.17, Technical Requirements for Land Disposal Facilities, on which disposal of such wastes is premised. Specifically, disposal of Class C waste is premised on compliance with 10 CFR 61.55(a)(2)(iii) and 10 CFR 61.56, which highlights the need to include the TDEC-compatible rules as ARARs in the ROD. Those rules are Tenn. Comp. R. & Regs. §§ 0400-20-11-.17(6)(b)(3) and 0400-20-11-.17(7), respectively.

ROD (Appendix A & Table 2.4) should list all waste characteristics requirements in Tenn. Comp. R. & Regs. § 0400-20-11-.17(7) as ARARs and cite them verbatim. The first

sic paragraphs of Tenn. Comp. R. & Regs. § 0400-20-11-.17(7) are included, but the seventh paragraph (gas pressures and activities) and eighth paragraph (hazardous, biological, pathogenic or infectious material) are not. The site stability rule at Tenn. Comp. R. & Regs. § 0400-20-11-.16(5) should be an ARAR, particularly with the acceptance of Class C waste.

129. **DOE Orders**
DOE Orders should be designated TBC in the ROD. As noted in TDEC comments on the third draft (D3) and other drafts of the RI/FS, DOE Orders represent DOE's regulatory responsibilities under the Atomic Energy Act, as well as its obligation to maintain EMDF in perpetuity. Consequently, the ROD should list DOE Orders as TBC requirements because they provide a basis for more stringent requirements than the TDEC rules. The expectation is the more restrictive requirement will apply, as is typical of the CERCLA process.

130. **Page A-27, Table A-3, last entry on page**
The citation is for Tenn. Comp. R. & Regs. § 0400-12-01-.03(1)(a)(2)(i)(II), Independent Requirements of a Small Quantity Generator. Based on Tenn. Comp. R. & Regs. § 0400-12-01-.03(1)(d), Generator Category Determination, would not the applicable requirement be Tenn. Comp. R. & Regs. § 0400-12-01-.03(1)(a)(2)(i)(III), Independent Requirements of a Large Quantity Generator?

Editorial Comments

131. **Section 1.5, Page 1-7, 1st paragraph in section**
For consistency with the rest of the document, *Principal Threat Waste* should be lowercase.

132. **Section 2.1, Pages 2-1 and 2-2**
Consider numbering these pages, consistent with p. 3-1 and 3-2.

133. **Section 2.2.1, Page 2-6, 5th paragraph**
In the third sentence, correct "EDMF" to "EMDF."

134. **Section 2.2.1, Page 2-6, 5th paragraph**
In the third sentence, correct "EDMF" to "EMDF."

135. **Section 2.2.1, Page 2-9, 1st line**
Change "between" to "among."

136. **Section 2.5.2, Page 2-13, 1st partial paragraph, next-to-last sentence**
Change *confirms* to *confirm* in the sentence beginning, "The gradients and piezometric surface."

137. **Section 2.9.2, Page 2-18, 3rd paragraph below bullets**
Underdrains is plural, so change *an engineered feature* to *as engineered features*, and change *controls* to *control*.

138. **Section 2.10.7, Page 2-28, 2nd line of section**
Change "between" to "among."

139. **Section 2.12.2.3, Page 2-40, Administrative WAC, 3rd line**
Change "between" to "among."

140. **Table 2.4, Page 2-41, 7th row**
Change "it" to "they."

141. **Table 2.4, Page 2-41, Footnote a**
Change "between" to "among."

142. **For consistency with other CFR citations in the ROD, consider deleting both instances of Section 2.12.2.4, Page 2-46, 4th paragraph**
For consistency with other CFR citations in the ROD, consider deleting both instances of "equivalent to." Alternatively, consider replacing the phrase with "compatible with," which is the terminology used by the U.S. Nuclear Regulatory Commission (NRC) [https://www.nrc.gov/docs/ML1808/ML18081A070.pdf].

143. **Section 2.12.2.4, Page 2-46, Footnote 6**
Change "between" to "among."

144. **Section 2.13.2, Page 2-50, last paragraph**
For consistency with other CFR citations in the ROD, consider deleting both instances of "equivalent to." Alternatively, consider replacing the phrase with "compatible with," which is the terminology used by the U.S. Nuclear Regulatory Commission (NRC) [https://www.nrc.gov/docs/ML1808/ML18081A070.pdf].

145. **Section 2.13.2.3, Page 2-54, 1st paragraph in section**
The "-5" in the last line should be superscript.

146. **Page 3-5, Summary of Comments and Responses: Need for waivers**
Italicize the title of the guidance document cited in the first sentence.

Questions or comments concerning the contents of this letter should be directed to Brad Stephenson at the above address, by phone at (865) 220-6587 or by email at brad.stephenson@tn.gov.

Sincerely,

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